Issued July 1968

SOIL SURVEY

Davis-Weber Area, Utah

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with
UTAH AGRICULTURAL EXPERIMENT STATION

Major fieldwork for this soil survey was done in the period 1952–57. Soil names and descriptions were approved in 1965. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1960. This survey was made cooperatively by the Soil Conservation Service and the Utah Agricultural Experiment station; it is part of the technical assistance furnished to the Davis and Weber Soil Conservation Districts.

HOW TO USE THIS SOIL SURVEY

THIS SOIL SURVEY of the Davis-Weber Area, Utah, contains information that can be applied in managing farms and ranches; in selecting sites for roads, ponds, buildings, or other structures; and in appraising the value of tracts of land for agriculture, industry, or recreation.

Locating Soils

All of the soils of the Davis-Weber Area are shown on the detailed map at the back of this survey. This map consists of many sheets that are made from aerial photographs. Each sheet is numbered to correspond with numbers shown on the Index to Map Sheets.

On each sheet of the detailed map, soil areas are outlined and are identified by symbol. All areas marked with the same symbol are the same kind of soil. The soil symbol is inside the area if there is enough room; otherwise, it is outside and a pointer shows where the symbol belongs.

Finding and Using Information

The "Guide to Mapping Units" can be used to find information in the survey. This guide lists all of the soils of the area in alphabetic order by map symbol. It shows the page where each kind of soil is described, and also the page for the capability unit and range site in which the soil has been placed.

Individual colored maps showing the relative suitability or limitations of soils for many specific purposes can be developed by using the soil map and information in the text. Translucent material can be used as an overlay over the soil map and colored to show soils that have the same limitation or suitability. For example, soils that have a slight limitation for a given use can be colored green, those with a moderate limitation can be colored yellow, and those with a severe limitation can be colored red.

Farmers and ranchers can learn about use and management of the soils by reading the descriptions of the soils and of the capability groups, and range sites.

Game managers, sportsmen, and others concerned with wildlife will find information about soils and wildlife in the section "Use of Soils for Wildlife."

Ranchers and others interested in range can find under "Use and Management of Soils for Range" groupings of the soils according to their suitability for range, and also the plants that grow on each range site.

Community planners and others concerned with suburban development can read about the soil properties that affect the choice of homesites, industrial sites, schools, and parks in the section "Use of Soils in Community Development."

Engineers and builders will find under "Engineering Applications" tables that give engineering descriptions of the soils in the area and that name soil features that affect engineering practices and structures.

Scientists and others can read about how the soils were formed and how they are classified in the section "Formation, Morphology, and Classification of Soils."

Students, teachers, and others will find information about soils and their management in various parts of the text.

Newcomers in the Davis-Weber Area may be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the section "Additional Facts About the Davis-Weber Area."

Cover picture: In the foreground, irrigated improved pasture on Ironton silt loam, 0 to 1 percent slopes; in the middle distance, Kilburn gravelly sandy loam; and in the background, the Wasatch Mountains.

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NOTICE TO LIBRARIANS

Series year and series number are no longer shown on soil surveys. See explanation on the next page.

Issued July 1968

EXPLANATION

Series Year and Series Number

Series year and number were dropped from all soil surveys sent to the printer after December 31, 1965. Many surveys, however, were then at such advanced stage of printing that it was not feasible to remove series year and number. Consequently, the last issues bearing series year and number will be as follows:

Series 1957, No. 23, Las Vegas and Eldorado Valley Areas, Nev.
Series 1958, No. 34, Grand Traverse County, Mich.
Series 1959, No. 42, Judith Basin Area, Mont.
Series 1960, No. 31, Elbert County, Colo. (Eastern Part)
Series 1961, No. 42, Camden County, N.J.
Series 1962, No. 13, Chicot County, Ark.
Series 1963, No. 1, Tippah County, Miss.

Series numbers will be consecutive in each series year, up to and including the numbers shown in the foregoing list. The soil survey for Tippah County, Miss., will be the last to have a series year and series number.

SOIL SURVEY OF DAVIS-WEBER AREA, UTAH

BY AUSTIN J. ERICKSON, SOIL CONSERVATION SERVICE, AND LEMOYNE WILSON, UTAH AGRICULTURAL EXPERIMENT STATION

SOILS SURVEYED BY VERN K. HUGHIE, WOODROW NIELSON, AND RAYMOND S. CHADWICK, SOIL CONSERVATION SERVICE, AND LEMOYNE WILSON, UTAH AGRICULTURAL EXPERIMENT STATION [1]

UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, IN COOPERATION WITH UTAH AGRICULTURAL EXPERIMENT STATION

THE DAVIS-WEBER AREA is in the north-central part of Utah (fig. 1). It consists of about 160 square miles, or 102,435 acres, in Davis County and about 185 square miles, or 118,434 acres, in Weber County. This is the greater part of these counties. Ogden is the largest city in the survey area, but Farmington and Bountiful are also important.

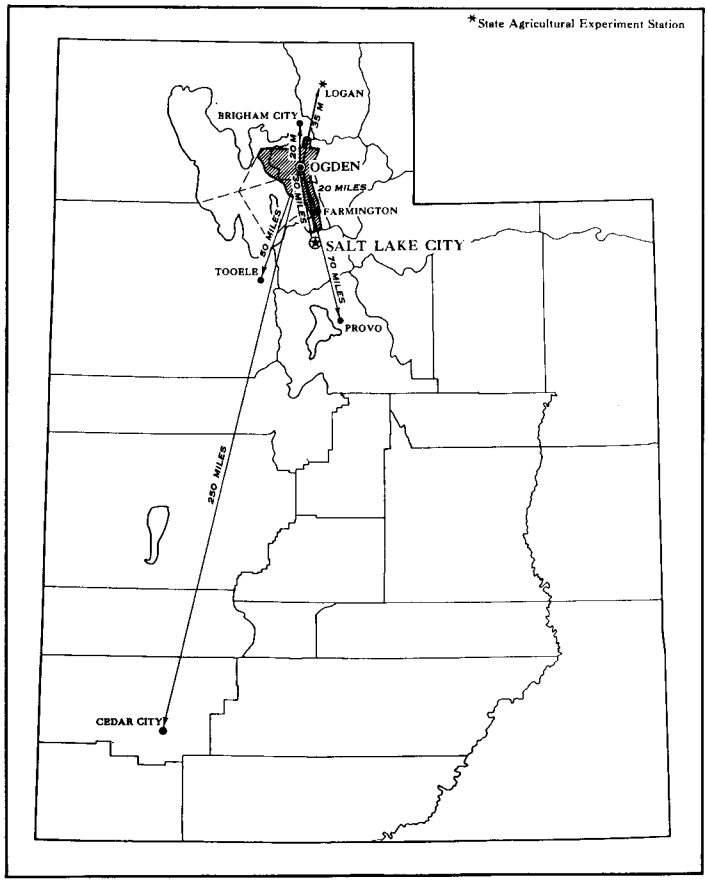

Figure 1.—**Location of the Davis-Weber Area in Utah.**

Farming is of considerable importance and is fairly well diversified, but the acreage farmed has been curtailed by residential and industrial development. Much of this development has occurred since about 1945 as nearby Salt Lake City and Ogden have rapidly expanded. Most of the acreage farmed is irrigated. The principal crops are orchard fruits, grain and truck crops, sugarbeets, and improved pasture and hay crops.

The climate of the Davis-Weber Area is warm and dry in summer and cold but not severe in winter. The growing season is long enough for most crops, especially orchard fruits. Rainfall is limited, however, during the growing season, and irrigation is needed for crops.

The Davis-Weber Area is within the Middle Rocky Mountain Province and the Great Basin section of the Basin and Range physiographic province (*7*).[2] It is part of the valley around Great Salt Lake. The area consists largely of lake terraces that were formed during Pleistocene geologic time by Lake Bonneville and other lakes (*8*) and of alluvial fans adjacent to the Wasatch Mountains (fig. 2). These fans are of Recent geologic time or somewhat older. The mountains, except as required to form boundaries along section lines, were excluded from the survey.

Elevations of the major part of the area range from 4,220 to 5,200 feet above sea level, but some parts extend to about 5,600 feet. The highest peaks in the Wasatch Mountains are more than 9,000 feet. The level of Great Salt Lake fluctuates, but the shoreline is generally about 4,205 feet above sea level.

Sediment carried by the Weber River provided the material that formed extensive lake terraces around the ancient Lake Bonneville and the more recent flood plains. This river now drains the large central and northwestern parts of the survey area. Many small streams that head on the western slopes of the mountains flow directly into Great Salt Lake. Most of these streams have cut deep channels through the lake terraces.

The Weber and Ogden Rivers provide most of the irrigation water used in the survey area. Some water is furnished early in the year by small streams that flow from the Wasatch Mountains. Springs in the mountains are a good source of water for domestic use.

[1] Others participating in the field survey were EARL J. TUTTLE, GORDON C. CRANDALL, VEAR L. MORTENSEN, KEITH J. CHAPMAN, HOWARD A. STOKES, CLIFFORD RICHENS, K. MARCEL TINGEY, DAVID H. CROCKETT, and LUDENE B. CAMPBELL, Soil Conservation Service.

[2] Italic numbers in parentheses refer to Literature Cited, p 147.

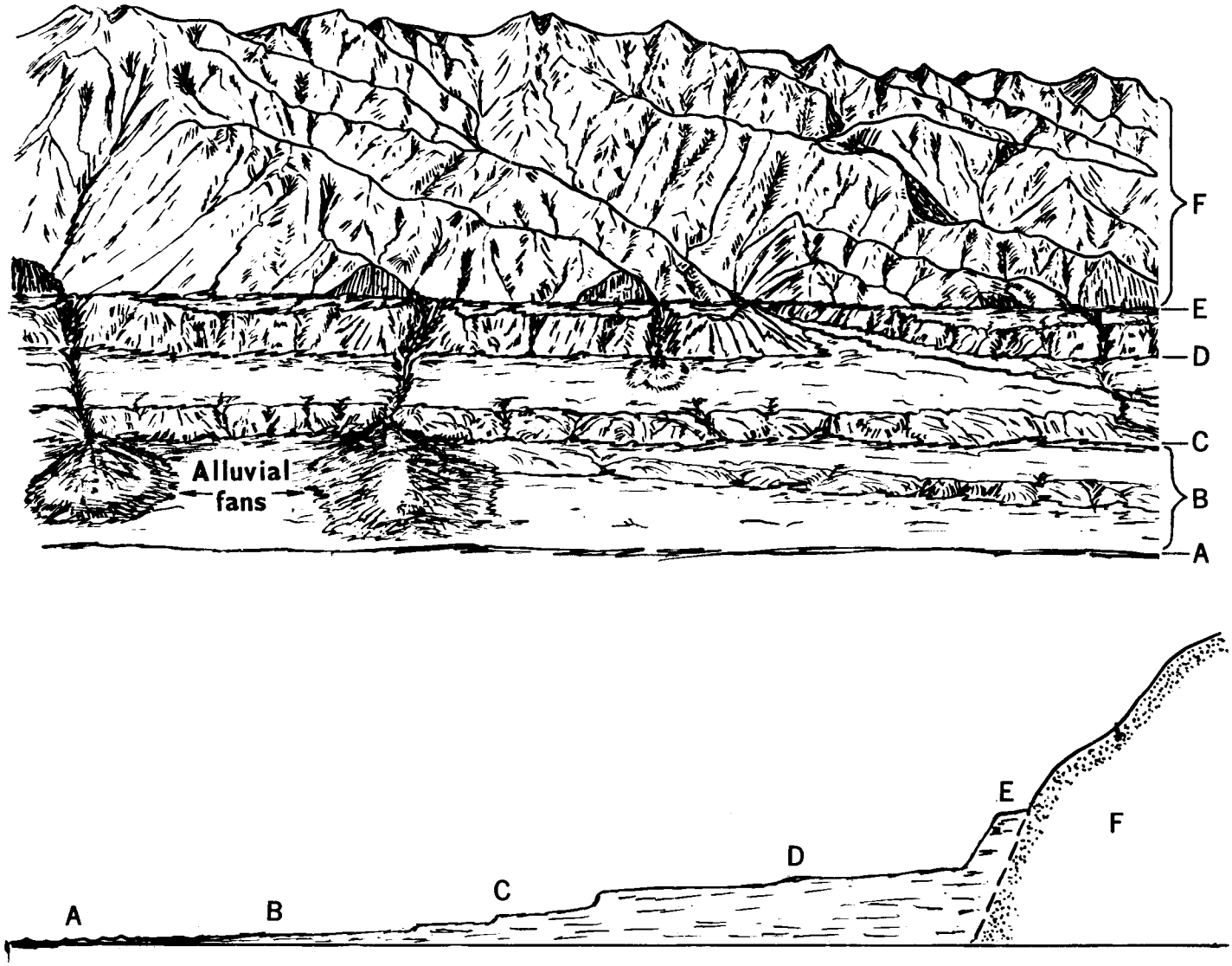

Figure 2.—**Looking east from Great Salt Lake. *A*, Great Salt Lake; *B*, lake plain; *C*, Stansbury shoreline; *D*, Provo shoreline; *E*, Bonneville shoreline; and *F*, Wasatch Mountains.**

Climate [3]

The Davis-Weber Area is west of and adjacent to the Wasatch Mountains. This high mountain barrier rises more than 9,000 feet above sea level. It has a marked influence on the climate in the area, for most storms approach from the west and northwest. As the air currents rise over the mountains, some of the moisture condenses and falls as rain or snow. Because it is nearer to the mountains, the eastern part of the area receives several inches more precipitation than the western part.

Great Salt Lake is along the western border of the area. Because of its high content of salt, this large body of water never freezes over. It therefore has a modifying effect on temperatures over the area, particularly during winter and summer.

The climate of the area ranges from dry subhumid in the western part to moist subhumid in the eastern part (*13*). The average annual precipitation ranges from 12 to 14 inches along the western border of the area near the lake; it is as much as 20 inches in the foothills along the eastern border. Estimated precipitation for some of the higher areas in the mountains is 25 to 30 inches. The annual precipitation in cultivated areas ranges from about 14 to 20 inches.

The Davis-Weber Area has four well-defined seasons. The average annual temperature is generally in the low 50's, and the range between the average summer and winter temperature is generally about 40 degrees.

Summers are characterized by warm dry weather. July normally is the driest month in the year. Most of the

[3] MERLE J. BROWN, State climatologist, U.S. Weather Bureau, Salt Lake City, Utah, assisted in preparing this subsection.

precipitation in summer comes in afternoon and evening thundershowers. As is characteristic of thundershowers, the amount of precipitation varies considerably from place to place.

Winters are cold but usually are not severe. The mountains along the eastern and northeastern border act as a barrier to the movement of cold continental air masses, and extended periods of extremely cold weather are rare.

Precipitation is relatively light during summer and early in fall. It is heaviest in spring when storms that move through the area from the Pacific Ocean are more intense. The wettest month usually is April, the month when most parts of the area receive more than 1½ inches of rain. About one-third of the annual precipitation comes as snow that falls during the period from December through March. The average annual snowfall ranges from 40 to 60 inches along the western front of the Wasatch Mountains. Hail, though normally of small size, occasionally causes some damage to crops and property during spring and summer.

Winds are generally light to moderate all year. Normally they are less than 20 miles per hour, but strong damaging winds occur occasionally. The strongest are easterly winds blowing from canyons in the Wasatch Mountains and winds accompanying local thundershowers. The strong winds from the canyons do not blow for more than 5 miles westward from the mountains.

On clear nights when cooling by radiation is greatest, cold air drains down the slopes of the mountains and accumulates in the valleys. As a result, the foothills and benched areas remain warmer than the lower areas. For this reason, orchard fruits and other tender crops are grown on the slopes, and the hardier crops of grains and vegetables are grown on the lower lake terraces and bottom lands. Temperature and precipitation data at Farmington are given in table 1; data for Ogden are given in table 2.

The length of the growing season, or freeze-free period, over most of the area averages about 156 days. It extends from late in April to about the middle of October. Frosts occur late in spring in much of the area. Frosts that damage fruit crops are less likely to occur along the foothills and near the mouths of canyons where air drainage is good.

Figure 3 shows, in percentages, the probability that temperatures of 16° F. or lower, 20° or lower, 24° or lower, 28° or lower, or 32° or lower will occur at Farmington or at Ogden Power House before any date in fall.

To determine from figure 3 the probability that there will be a temperature of 28° or lower at Farmington before October 21, lay a ruler horizontally on the October 21 line. Look up from the point where the ruler crosses the dashed diagonal 28° line, and read the percentage at the top of the graph. For this example the probability is about 40 percent. To determine the probability that the temperature will be 28° or lower at Ogden Power House on October 21, look up from the point where the ruler crosses the solid diagonal 28° line. In the same manner you can determine from figure 4 the probability that the temperature listed will occur at these places after any date in spring.

TABLE 1.—*Temperature and precipitation at Farmington, Utah*

[Elevation 4,267 feet]

Month	Temperature					Precipitation		
	Average	Average daily maximum	Average daily minimum	Two years in 10 will have at least 4 days with—		Average	One year in 10 will have—	
				Maximum temperature equal to or higher than—	Minimum temperature equal to or lower than—		Less than—	More than—
	°F.	°F.	°F.	°F.	°F.	Inches	Inches	Inches
January	28.5	37.5	18.4	52	−2	2.19	0.70	3.9
February	33.5	43.9	23.7	60	6	1.88	.75	3.5
March	41.2	52.8	29.7	68	16	2.07	.90	3.9
April	49.6	63.9	37.5	79	27	2.34	1.10	4.5
May	58.0	73.2	44.6	88	33	1.85	.40	3.9
June	64.7	81.8	51.0	95	41	1.28	.05	3.2
July	74.6	92.0	59.0	100	49	.54	.01	1.6
August	72.2	90.0	57.4	98	48	1.05	.03	2.6
September	62.1	80.7	47.8	93	37	.92	.10	2.5
October	51.3	67.9	38.8	83	28	1.62	.20	3.4
November	39.8	51.0	28.3	66	13	1.91	.40	3.2
December	30.6	41.0	22.4	55	5	1.87	.75	3.5
Year	50.5	64.6	38.2			19.52	14.80	24.2

TABLE 2.—*Temperature and precipitation at Ogden Sugar Factory*

[Elevation 4,280 feet]

Month	Temperature					Precipitation		
	Average	Average daily maximum	Average daily minimum	Two years in 10 will have at least 4 days with—		Average	One year in 10 will have—	
				Maximum temperature equal to or higher than—	Minimum temperature equal to or lower than—		Less than—	More than—
	°F.	°F.	°F.	°F.	°F.	Inches	Inches	Inches
January	25.9	36.1	16.5	50	−2	1.66	0.65	3.17
February	32.4	42.0	22.4	58	5	1.44	.36	2.95
March	40.4	51.2	29.1	65	18	1.54	.55	2.61
April	50.0	62.5	37.3	77	28	2.12	.73	4.25
May	58.5	72.3	44.7	87	34	1.66	.52	3.34
June	66.4	81.5	51.5	94	42	1.23	.04	3.03
July	75.8	91.6	59.4	98	51	.53	.01	1.19
August	73.3	89.1	57.3	97	46	.73	.02	2.54
September	63.1	80.0	47.9	92	37	.82	.04	2.24
October	52.5	66.9	38.2	81	29	1.51	.04	3.27
November	38.8	49.7	27.6	63	15	1.52	.04	3.07
December	29.9	39.8	21.1	52	9	1.68	.68	2.95
Year	50.5	63.6	37.8			16.44	12.46	22.10

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soils are in the Davis-Weber Area, where they are located, and how they can be used.

They went into the survey area knowing they likely would find many kinds of soils they had already seen, and perhaps some they had not. As they traveled over the area, they observed steepness, length, and shape of slopes; size and speed of streams; kinds of native plants or crops; kinds of rock; and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material that has not been changed much by leaching or by roots of plants.

The soil scientists made comparisons among the profiles they studied, and they compared these profiles with those in counties nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures. For successful use of this survey, it is necessary to know the kinds of groupings most used in a local soil classification.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all the soils of one series have major horizons that are similar in thickness, arrangement, and other important characteristics. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Draper and Francis, for example, are the names of two soil series. All the soils in the United States having the same series name are essentially alike in those characteristics that go with their behavior in the natural landscape. Soils of one series can differ somewhat in texture of the surface soil and in slope, stoniness, or some other characteristic that affects use of the soils by man.

Many soil series contain soils that differ in texture of their surface layer. According to such differences in texture, separations called soil types are made. Within a series, all the soils having a surface layer of the same texture belong to one soil type. Kirkham loam and Kirkham silty clay loam are two soil types in the Kirkham series. The difference in texture of their surface layers is apparent from their names.

Some types vary so much in slope, degree of erosion, number and size of stones, or some other feature affecting their use, that practical suggestions about their management could not be made if they were shown on the soil map as one unit. Such soil types are divided into phases. The name of a soil phase indicates a feature that affects management. For example, Pleasant View loam, 1 to 3 percent slopes, is one of several phases of Pleasant View loam, a soil type that ranges from nearly level to hilly.

After a guide for classifying and naming the soils had been worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, trees, and other details that greatly help in drawing soil boundaries accurately. The soil map at the back of this survey was prepared from the aerial photographs.

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning management of farms and fields, a mapping unit is nearly equivalent to a soil type or a phase of soil type. It is not exactly equivalent, because it is not practical to show on such a map all the small, scattered bits of soil of some other kind that have been seen within an area that is dominantly of a recognized soil type or soil phase.

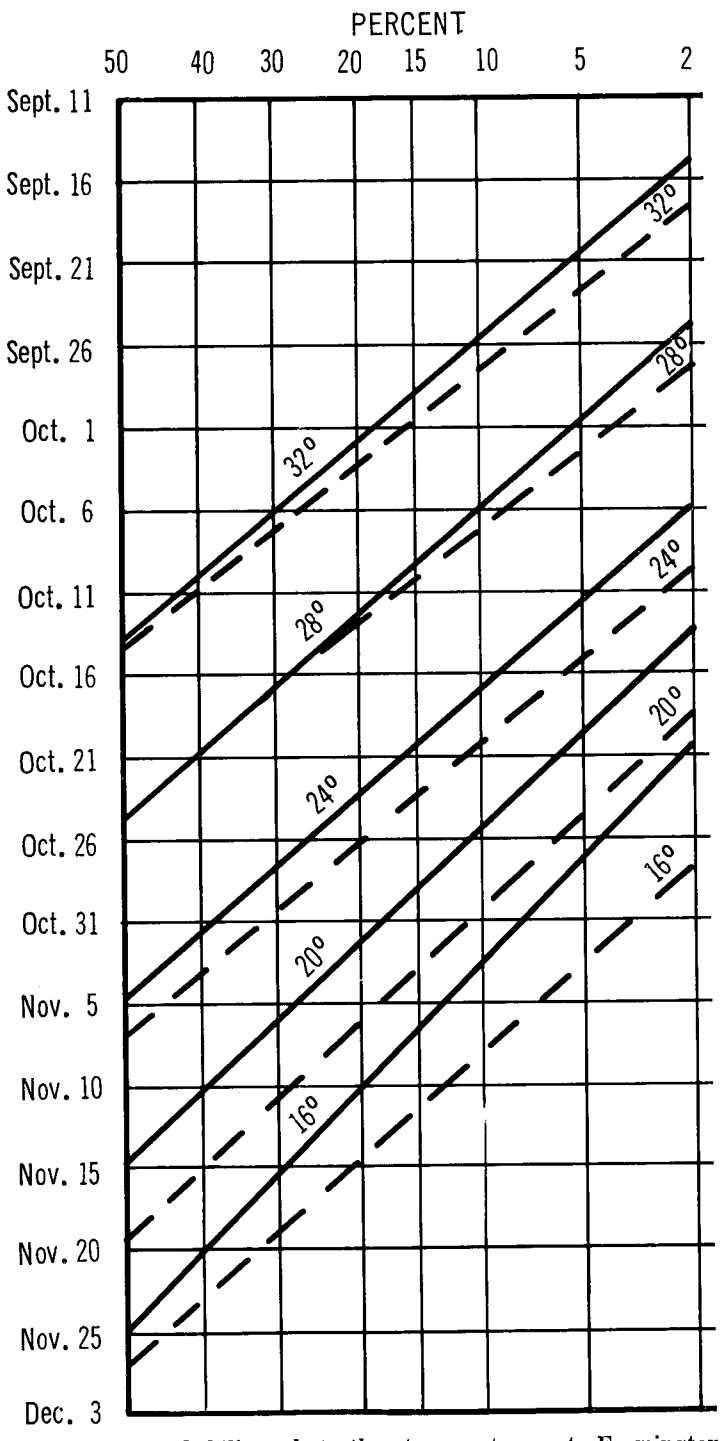

Figure 3.—Probability that the temperature at Farmington (dashed lines) and at Ogden Power House (solid lines) will be 16° F. or lower, 20° or lower, 24° or lower, 28° or lower, or 32° or lower before any date in fall.

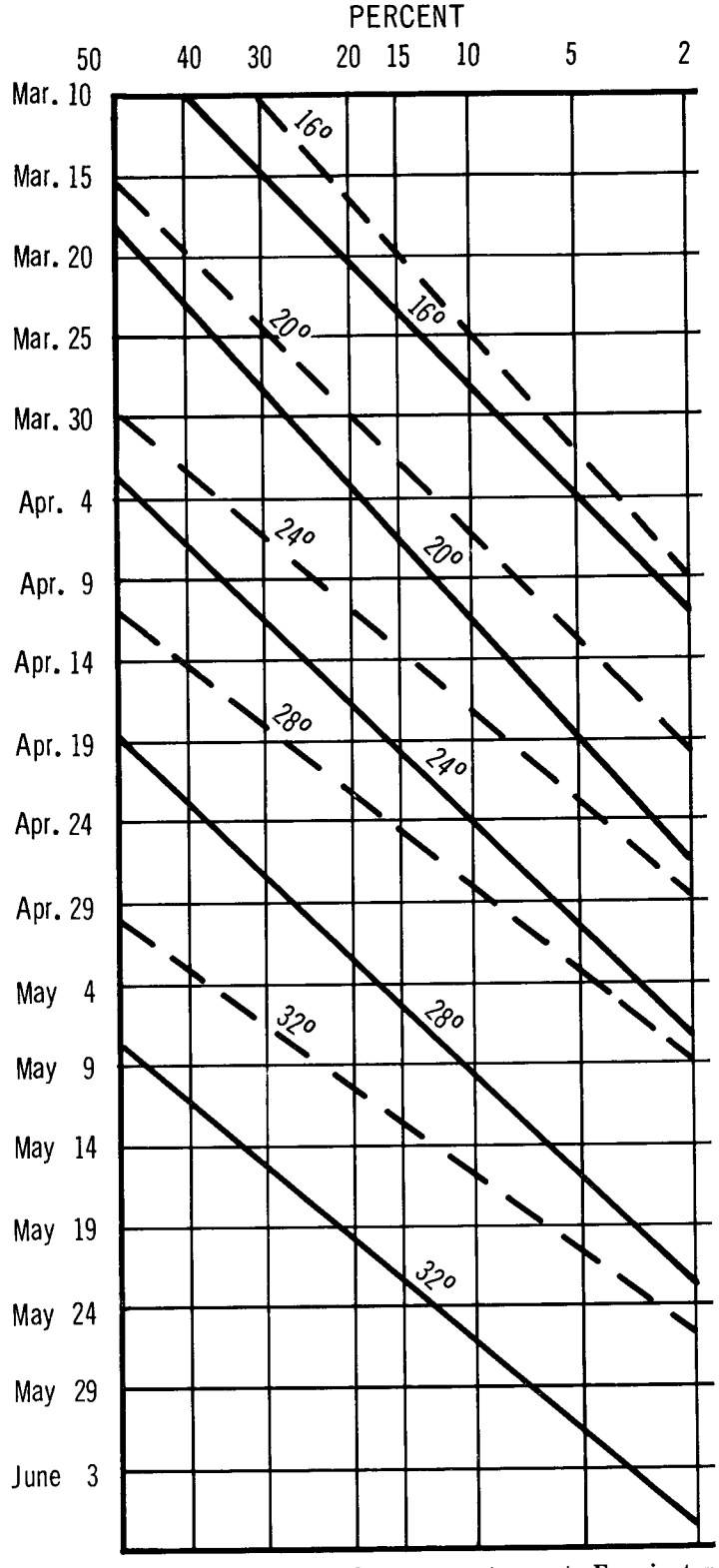

Figure 4.—Probability that the temperature at Farmington (dashed lines) and at Ogden Power House (solid lines) will be 16° F. or lower, 20° or lower, 24° or lower, 28° or lower, or 32° or lower after any date in spring.

In preparing some detailed maps, the soil scientists have a problem of delineating units where different kinds of soils are in areas so intricately mixed, and so small in size that it is not practical to show them separately on the map. Therefore, they show this mixture of soil areas as one mapping unit and call it a soil complex. Ordinarily, a soil complex is named for the major kinds of soil in it, for example, Airport-Ford complex.

Some mapping units contain more than one kind of soil in a pattern more open and less intricate than that of a soil complex. Such a mapping unit is called a soil association. A soil association differs from a soil complex in that the component soils could be mapped separately, at ordinary scales such as 4 inches per mile, if practical advantages would make the effort worthwhile. Separate mapping at ordinary scales is not possible for a soil complex. A soil association, like a soil complex, is named for the major soils in it, for example, Kilburn-Francis association, 10 to 20 percent slopes, eroded.

The soil scientist may also show as one mapping unit two or more soils, soil phases, or land types if the differences between them are so small that they do not justify separation for the purpose of the survey. Such a mapping unit is called an undifferentiated soil group; for example, Hillfield soils, 6 to 10 percent slopes, eroded.

On most soil maps, areas are shown that are so rocky, so shallow, or so frequently worked by wind and water that they scarcely can be called soils. These areas are shown on a soil map like other mapping units, but they are given descriptive names, such as Made land and Rock outcrop, and are called land types rather than soils.

While a soil survey is in progress, samples of soils are taken, as needed for laboratory measurements and for engineering tests. Laboratory data from the same kinds of soils in other places are assembled. Data on yields of crops under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soils. Yields under defined management are estimated for all the soils.

But only part of a soil survey is done when the soils have been named, described, and delineated on the map, and the laboratory data and yield data have been assembled. The mass of detailed information then needs to be organized in a way that it is readily useful to different groups of readers, among them farmers, ranchers, engineers, and homeowners. Grouping soils that are similar in suitability for each specified use is the method of organization commonly used in the soil surveys. On the basis of yield and practice tables and other data, the soil scientists set up trial groups, and then test them by further study and by consultation with farmers, agronomists, engineers, and others. Then, the scientists adjust the groups according to the results of their studies and consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under present methods of use and management.

General Soil Map

The general soil map at the back of this survey shows, in color, the ten soil associations in the Davis-Weber Area. A soil association is a landscape that has a distinctive proportional pattern of soils. It normally consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in one association may occur in another, but in a different pattern.

A map showing soil associations is useful to people who want a general idea of the soils in an area, who want to compare different parts of an area, or who want to know the location of large tracts that are suitable for a certain kind of farming or other land use. Such a map is not suitable for planning the management of a farm or field, because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect management.

The ten soil associations in the Davis-Weber Area are discussed on the following pages.

1. Ridd-Rock Outcrop Association

This association consists of well-drained to somewhat excessively drained, rocky and stony sandy loams of the uplands. It is in three areas. Two are along the eastern border of the survey area in narrow strips extending in a north-south direction. The third is in the northwestern part in a small area called Little Mountain. The association is on sloping to very steep mountainsides and covers about 6 percent of the survey area.

Ridd soils make up about 75 percent of this association; Rock outcrop, 20 percent; and minor soils, 5 percent.

The Ridd soils are moderately deep, well-drained, rocky and stony sandy loams. They formed in alluvium and residuum that weathered mainly from gneiss, schist, quartzite, and tillite. These soils are moderately permeable to rapidly permeable and are susceptible to severe erosion. Bare surfaces of rock, mainly quartzite, make up Rock outcrop.

The Barton are the most extensive minor soils in this association. These soils are on low hills adjacent to Great Salt Lake in the northwestern part of the survey area. They are rocky and very rocky loams that have pebbles, cobbles, and stones in their surface layer.

Elevations in this association range from 4,220 to 5,600 feet above sea level. The climate ranges from dry subhumid to moist subhumid. The average annual precipitation ranges from about 13 to 25 inches, and the average annual temperature ranges from 47° to 52° F. The frost-free season ranges from 150 to 175 days.

The soils of this association are used as wildlife habitat and for watershed purposes. Management is needed mainly for controlling erosion.

2. Kilburn Association

This association consists of well-drained to somewhat excessively drained, gravelly and cobbly sandy loams of the alluvial fans, high terraces, and old deltas. It is in two areas. One is long and narrow and extends in a north-south direction along the eastern border for the full length of the survey area. The other is a small area near the east-central part. These combined cover about 12 percent of the survey area.

Kilburn soils make up about 85 percent of this association, and minor soils about 15 percent.

Kilburn soils are on nearly level to moderately steep

alluvial fans, high terraces, and old deltas along the base of the Wasatch Mountains. They are deep or moderately deep, gravelly, cobbly, or stony sandy loams that are well drained to somewhat excessively drained. These soils formed in mixed gravelly residuum or alluvium that weathered from gneiss, schist, or granite. They are moderately permeable to rapidly permeable. Available water capacity is moderate, and natural fertility is moderate to moderately low.

Sterling, Ridd, Francis, and Pleasant View are the minor soils of this association. The Sterling soils are somewhat excessively drained, deep, gravelly, cobbly, or very rocky loams; and the Ridd soils are well-drained rocky and stony sandy loams. Francis soils are deep loamy fine sands, and the Pleasant View are deep loams and gravelly loams.

Elevation in this association ranges from 4,400 to 5,200 feet above sea level. The climate ranges from moist subhumid to dry subhumid. The average annual precipitation ranges from 15 to 20 inches, and average annual temperature ranges from 47° to 52° F. The frost-free season ranges from 150 to 175 days.

The soils in this association are gravelly and cobbly and therefore moderately difficult to till. These soils are used for irrigated farming, community and industrial developments, range, wildlife habitat, and watersheds. Areas used for range and for watersheds are higher than the present sources of irrigation water. Small orchards of peaches, of cherries, and of apricots are the main irrigated areas. Management is needed mainly for controlling erosion and for applying irrigation water efficiently.

3. Preston-Francis Association

This association consists of excessively drained and somewhat excessively drained fine sands and loamy fine sands of the high lake terraces. It is in three small areas. Two areas are in Davis County, the largest northeast and the smallest east of Clearfield. The third is at the southern tip of Ogden in Weber County. This association is mainly on high terraces and covers about 4 percent of the survey area.

Preston soils make up about 55 percent of this association; Francis soils, 35 percent; and minor soils, 10 percent.

The Preston soils are excessively drained fine sands, and the Francis soils are somewhat excessively drained loamy fine sands. Both the Preston and Francis soils formed in sand and loamy sand that have been extensively reworked by wind, and they are deep and rapidly permeable. These soils are droughty, have low available water capacity, and have low to moderate natural fertility. They are susceptible to severe soil blowing.

The minor soils of this association are the Layton, Kidman, and Kilburn. Elevations in this association range from 4,400 to 5,200 feet above sea level. The climate ranges from moist subhumid to dry subhumid. The average annual precipitation ranges from 15 to 20 inches, and average annual temperature ranges from 47° to 52° F. The frost-free season ranges from 150 to 175 days.

The soils of this association are used for irrigated farming, dryland farming, range, and community and industrial developments. Irrigated areas consist mainly of peach, cherry, or apricot orchards not more than 10 acres in size. Irrigation water is generally applied by sprinklers. Most areas of Preston soils are idle, but some are used for range. Dryfarmed areas of this association produce winter wheat in alternate years, but these soils are poorly suited to dryfarmed crops. Control of soil blowing and efficient use of irrigation water are major concerns in management.

4. Parleys-Timpanogos-Kidman Association

This association consists of well drained and moderately well drained loams, fine sandy loams, and very fine sandy loams on terraces of medium height. It is in four areas scattered from north to south. Two areas are in Weber County in the northeastern part of the survey area, one is near the central part of Davis County, and one is in the extreme southern part of Davis County. This association is mainly on the strongly sloping and steep terrace escarpments that face south. It covers about 14 percent of the survey area.

Parleys soils make up about 40 percent of this association; Timpanogos soils, 20 percent; Kidman soils, 15 percent; and minor soils, 25 percent.

Parleys, Timpanogos, and Kidman soils all are deep and well drained or moderately well drained. The Parleys soils are loams, the Timpanogos are loams and very fine sandy loams, and the Kidman are fine sandy loams. These soils are friable, are easily tilled, and absorb water readily. Permeability is moderately rapid to moderately slow, and available water capacity is high. Natural fertility is moderately high to high.

Hillfield and Ackmen are the most extensive minor soils in this association. These soils are deep and well drained. The Hillfield soils are on steep terrace escarpments, and the Ackmen are on nearly level to moderately steep alluvial fans or along drainageways.

Elevations in this association range from 4,350 to 5,100 feet above sea level. The climate is dry subhumid. The average annual precipitation ranges from about 15 to 20 inches, and average annual temperature from 47° to 52° F. The frost-free season ranges from 150 to 175 days.

The soils of this association are extensively irrigated. The main crops are alfalfa, corn, small grains, sugarbeets, tomatoes, potatoes, cherries, peaches, and pears. Improved pasture is also irrigated. Most of the farming is on small general farms, most of them less than 40 acres in size. The main needs on the nearly level to gently sloping soils are leveling to a uniform grade and distributing of irrigation water evenly, but controlling water erosion is more important on the more sloping soils.

5. Kidman-Layton Association

This association consists of well drained and moderately well drained fine sandy loams and loamy fine sands on terraces of medium height. It is in three areas. The largest area is an irregular strip west of Roy and Sunset in Davis and Weber Counties; the smallest is in the vicinity of West Weber in Weber County; and the third is between Farr West and Plain City in Weber County.

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The two areas in Weber County are remnants of old lake terraces. This association covers about 8 percent of the survey area.

Kidman soils make up about 60 percent of this association; Layton soils, 35 percent; and minor soils, 5 percent.

The Kidman soils most commonly are on broad, nearly level terraces, and the Layton soils are on nearly level to strongly sloping terraces. Both kinds of soils are deep and well drained or moderately well drained. The Kidman soils are fine sandy loams, and the Layton soils are loamy fine sands. These soils are friable and can be tilled throughout a wide range of moisture content. Permeability is rapid to moderately rapid, and the available water capacity is moderate to high. Natural fertility ranges from high to moderate.

The Preston, Francis, and Timpanogos are minor soils of this association.

Elevations in this association range from 4,350 to 5,100 feet above sea level. The climate is dry subhumid. The average annual precipitation ranges from about 15 to 20 inches, and average annual temperature ranges from 47° to 52° F. The frost-free season ranges from 150 to 175 days.

The soils of this association are used mainly for irrigated alfalfa, corn, small grains, sugarbeets, tomatoes, and potatoes. Cherries, peaches, and apricots are grown in orchards west of Roy and Sunset. Most farms are irrigated and are less than 40 acres in size, but a few are larger. Control of erosion, especially soil blowing on the Layton soils, and efficient use of irrigation water are the main requirements for good management.

6. Sunset-Kirkham-Martini Association

This association consists of somewhat poorly drained and moderately well drained, dark-colored, slightly saline-alkali loams, fine sandy loams, and silty clay loams on flood plains and in depressions on terraces. It is in a single irregularly shaped area on the nearly level flood plains along the Weber and the Ogden Rivers. Almost all of it is in Weber County. It covers about 8 percent of the survey area.

Sunset soils make up about 50 percent of this association; Kirkham soils, 20 percent; Martini soils, 20 percent; and minor soils, 10 percent.

The Sunset soils are moderately well drained and somewhat poorly drained loams; the Kirkham are somewhat poorly drained loams and silty clay loams; and the Martini are moderately well drained fine sandy loams. All these soils formed in alluvium or old lake sediments ranging from gravelly loamy sand to silty clay loam in texture. Permeability is moderate to moderately slow, and available water capacity is high. Natural fertility is moderately high.

Minor soils of this association are the Refuge, Steed, and Wayment. The Refuge soils are loams that have a high content of salt below a depth of 20 inches. Steed soils are moderately well drained gravelly fine sandy loams. Wayment soils are poorly drained silty clay loams that have a high content of salt at a depth of less than 20 inches.

Elevations in this association range from 4,220 to 4,600 feet above sea level. The climate is dry subhumid. The average annual precipitation ranges from 13 to 18 inches, and average annual temperature ranges from 47° to 52° F. The frost-free season ranges from 150 to 175 days.

The soils of this association are used mainly for irrigated alfalfa, corn, small grains, and sugarbeets. Improved pasture is also irrigated, and some areas are used for range. Drainage and reclamation are needed.

7. Ironton-Logan-Draper Association

This association consists of moderately well drained to very poorly drained, dark-colored loams, silt loams, and silty clay loams on flood plains and in depressions on terraces. It is in four scattered areas, two in Davis County and two in Weber County. The largest is west of Farmington, Centerville, and Bountiful in the southern part of Davis County; the second, a relatively small area, is about 1 mile west of Kaysville; the third is in the vicinity of North Ogden; and the fourth is northwest of Ogden. This association covers about 8 percent of the survey area.

Ironton soils make up about 40 percent of this association; Logan soils, 20 percent; Draper soils, 20 percent; and minor soils, 20 percent.

The Ironton and the Logan soils developed mainly in lake-laid sediments. The Ironton soils are somewhat poorly drained and moderately well drained, highly calcareous silt loams. The Logan soils are poorly drained and very poorly drained, highly calcareous silty clay loams. The Draper soils are somewhat poorly drained loams that are noncalcareous or slightly calcareous. The soils of this association are deep, black or very dark gray, and moderately high or high in content of organic matter. They contain little, if any, salt or alkali. Permeability is moderate to slow, and available water capacity is high. Natural fertility ranges from moderate to high.

Minor soils of this association are the Roshe Springs, Woods Cross, and Cudahy. The Roshe Springs soils are poorly drained and very poorly drained, highly calcareous silt loams. The Woods Cross are poorly drained silty clay loams that are noncalcareous or slightly calcareous. The Cudahy are moderately deep, poorly drained silt loams that have a lime-cemented pan.

Elevations in this association range from 4,220 to 4,600 feet above sea level. The climate is dry subhumid. The average annual precipitation ranges from 13 to 18 inches, and average annual temperature from 47° to 52° F. The frost-free season ranges from 150 to 175 days.

In partly or sufficiently drained areas, these soils are used for irrigated crops, mainly alfalfa, corn, small grains, and truck crops. Improved pasture is also irrigated. These soils are generally in good tilth because their content of organic matter is high, but planting may be delayed because they warm somewhat slowly in spring. Undrained areas of these soils are used for unimproved pasture. Drainage is the main management needed.

8. Warm Springs-Syracuse Association

This association consists of somewhat poorly drained, saline-alkali fine sandy loams and loamy fine sands on

low terraces. It is in two areas. The smaller area is of irregular shape and is in the northern part of the survey area. The larger area is slightly inland from Great Salt Lake and extends parallel to the lake in a strip that narrows at its southern end. This association covers about 17 percent of the survey area.

Warm Springs soils make up about 60 percent of this associations; Syracuse soils, 25 percent; and minor soils, 15 percent.

Warm Springs soils are fine sandy loams, and Syracuse soils are loamy fine sands. Both Warm Springs and Syracuse soils formed in mixed old lake sediments of variable texture. These soils are deep, friable, somewhat poorly drained, and slightly to strongly saline-alkali. Permeability is moderate to moderately rapid, and available water capacity is high to moderate. The water table is generally below a depth of 3 feet. Natural fertility ranges from high to moderately low.

Minor soils of this association are the Harrisville, Leland, Gooch, Ford, and Croy. The Harrisville soils are somewhat poorly drained and moderately well drained and are slightly to moderately affected by alkali. Leland soils are strongly affected by alkali. Gooch soils are poorly drained and somewhat poorly drained and are slightly to strongly affected by salt and alkali. Ford soils are somewhat poorly drained and poorly drained and have a lime-cemented pan. Croy soils are somewhat poorly drained and have an indurated pan that is insoluble in either acid or alkali.

Elevations in this association range from 4,210 to 4,350 feet above sea level. The climate is dry subhumid. The average annual precipitation ranges from 13 to 18 inches, and average annual temperature from 47° to 52° F. The frost-free season ranges from 150 to 175 days.

The soils of this association are easily tilled and are used extensively for irrigated farming. The main crops are alfalfa, corn, small grains, sugarbeets, and tomatoes. Areas strongly affected by salt and alkali are used mainly for range. Farms in this association generally range from 40 to 80 acres. The main concerns in management are maintaining adequate drainage, leaching away salts and alkali, and applying irrigation water efficiently.

9. Leland-Payson-Warm Springs Association

This association consists of somewhat poorly drained and moderately well drained, saline-alkali silt loams and fine sandy loams on low terraces. It is in two areas. One is in the northwestern part of the survey area, and the other is in the extreme southwestern part. The association covers about 6 percent of the survey area.

About 30 percent of this association is Leland soils, 30 percent is Payson, and 30 percent is Warm Springs. The remaining 10 percent consists of minor soils.

Leland soils are deep, somewhat poorly drained and moderately well drained silt loams that are affected by salt and alkali. Payson soils are deep, somewhat poorly drained and moderately well drained silt loams. Warm Springs soils are deep, somewhat poorly drained fine sandy loams that are moderately to very strongly affected by salt and alkali. These soils formed in old lake sediments of variable texture.

Minor soils of this association are the Syracuse, Airport, Terminal, Saltair, Arave, and Logan. The Syracuse soils are deep, somewhat poorly drained loamy fine sands that are slightly to moderately affected by salt and alkali. Airport soils are somewhat poorly drained and poorly drained silt loams and silty clay loams. The Terminal soils are moderately deep, somewhat poorly drained loams over a lime-cemented pan. Saltair soils are deep, poorly drained and very poorly drained silty clay loams that contain a high concentration of salts. Arave soils are deep, poorly drained silt loams, and the Logan are deep, poorly drained and very poorly drained silty clay loams.

Elevations in this association range from 4,210 to 4,350 feet above sea level. The climate is dry subhumid. The average annual precipitation ranges from 13 to 18 inches, and average annual temperature from 47° to 52° F. The frost-free season ranges from 150 to 175 days.

These soils are friable and easily tilled. They are moderately permeable to very slowly permeable and generally have high available water capacity. Natural fertility ranges from moderately high to low. Attempts at draining and reclaiming these soils have had little success, though some areas have been drained and partly reclaimed. These areas are used for irrigated alfalfa, corn, and small grains and for improved pasture. Other areas are used mainly for range. The main management needs are drainage and reclamation.

10. Saltair-Wayment-Arave Association

This association consists of poorly drained and very poorly drained, very saline silty clay loams and silt loams on old lake plains, low terraces, or flood plains. It is in one narrow strip bordering Great Salt Lake along the western side of the survey area. It is on nearly level low lake plains, low terraces, or flood plains and covers about 17 percent of the survey area.

The Saltair soils make up about 35 percent of the association; Wayment soils, 30 percent; and Arave soils, 25 percent; and minor soils, 10 percent.

The Saltair soils are poorly drained and very poorly drained, and the Wayment soils are poorly drained. Both the Saltair and Wayment soils are deep silty clay loams that have a high concentration of salts in the upper 20 inches. Arave soils are deep, poorly drained silt loams that are moderately to strongly affected by alkali. All of these major soils formed in old lake sediments and alluvium of variable texture. They range from moderately slow to very slow in permeability and have low natural fertility.

Minor soils of this association are the Lakeshore and Refuge. The Lakeshore soils are deep, nearly level, poorly drained and very poorly drained silt loams and fine sandy loams. The Refuge soils are deep, somewhat poorly drained loams. The Refuge soils contain some salt throughout their profile, but the highest concentration is below a depth of 20 inches.

Elevations in this association range from 4,200 to 4,215 feet above sea level. The climate is dry subhumid. The average annual precipitation ranges from 13 to 16 inches, and average annual temperature from 47° to 52° F. The frost-free season ranges from 150 to 175 days.

The Saltair, Wayment, and Lakeshore soils are mainly wasteland; the Arave and Refuge soils have only limited use as rangeland. The soils of this association are not suitable for reclamation as farmland.

Use and Management of Soils

The soils of the Davis-Weber Area are used mostly for dryfarmed and irrigated crops, for pasture, and for range. This section explains how the soils may be used for those main purposes, and it gives predicted yields of the principal dryfarmed and irrigated crops. It also explains how the soils can be used for wildlife and for building highways, farm ponds, and other engineering structures. A table rates the limitations of the soils if used for foundations for dwellings, septic tanks, and other structures or facilities used in community development.

In discussing the use of soils as cropland and rangeland, the procedure is to describe groups of soils that have similar uses and that require similar management, and then to suggest management suitable for this group. The soils in each group are listed in the "Guide to Mapping Units" at the back of this soil survey.

Use of Soils For Crops and Pasture [4]

This subsection has three main parts. The first part explains the capability grouping of soils. In the second part, management of soils by capability units is discussed. In the third part, estimated yields of irrigated crops, fruits, and pastures are given in table 3 for each soil under two levels of management; and estimated yields of dryfarmed wheat are given in table 4.

Capability Groups of Soils

Capability classification is the grouping of soils to show, in a general way, their suitability for most kinds of farming. It is a practical classification based on the limitations of the soils, the risk of damage when they are used for the ordinary field crops or sown pastures, and the way they respond to treatment. The classification does not apply to most horticultural crops, or to rice and other crops that have special requirements for production. The soils are classified according to degree and kind of permanent limitations, but without consideration of major and generally expensive landforming that would change the slope, depth, or other characteristics of the soils; and without consideration of possible major reclamation.

In the capability system, all soils are grouped at three levels, the capability class, the subclass, and the unit. These are discussed in the following paragraphs.

Capability Classes, the broadest groupings, are designated by Roman numerals I through VIII. As the numerals increase, they indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I. Soils have few limitations that restrict their use.

Class II. Soils have some limitations that reduce the choice of plants or require moderate conservation practices.

Class III. Soils have severe limitations that reduce the choice of plants, require special conservation practices, or both.

Class IV. Soils have very severe limitations that restrict the choice of plants, require very careful management, or both.

Class V. Soils subject to little or no erosion but have other limitations, impractical to remove, that limit their use largely to pasture, range, woodland, or wildlife food and cover. (None in the Davis-Weber Area.)

Class VI. Soils that have severe limitations that make them generally unsuited to cultivation and limit their use largely to pasture or range, woodland, or wildlife food and cover.

Class VII. Soils that have very severe limitations that make them unsuited to cultivation and that restrict their use largely to grazing, woodland, or wildlife.

Class VIII. Soils and landforms that have limitations that preclude their use for commercial plant production without major reclamation and restrict their use to recreation, wildlife, or water supply, or to esthetic purposes.

Capability Subclasses are soil groups within one class; they are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, is used in those areas where climate is the chief limitation to the production of common cultivated crops.

In class I there are no subclasses, because the soils of this class have few limitations. Class V can contain, at the most, only subclasses indicated by *w*, *s*, and *c*, because the soils in it are subject to little or no erosion, though they have other limitations that restrict their use largely to pasture, range, woodland, wildlife, or recreation.

Capability Units are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping for making many statements about management of soils. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe–2 or IIIe–2. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation, and the small letter indicates the subclass, or kind of limitation, as defined in the foregoing paragraph. The Arabic numeral specifically identifies the capability unit within each subclass.

[4] Kenneth D. Searle, work unit conservationist, and Raymond Chadwick, soil scientist, Soil Conservation Service, assisted in preparing this subsection.

Management by capability units

In this subsection each capability unit in the Davis-Weber Area is described, and use and management are briefly discussed. To find the names of all the soils in any given capability unit, refer to the "Guide to Mapping Units" at the back of this survey.

The capability units in classes I through IV consist of soils that are well suited to irrigation and that are generally irrigated. The units in classes VI through VIII consist of soils that are not irrigated but are used for grazing, watershed, or wildlife habitat.

CAPABILITY UNIT I–1 (IRRIGATED)

This capability unit consists of deep, well-drained, nearly level loams on lake terraces, recent alluvial fans, and flood plains. Drainage is better in some areas of these well-drained soils than in other areas.

These highly fertile soils are friable, are easily tilled, and absorb moisture readily. From 2 to 5 percent of the surface layer is organic matter. Permeability of the subsoil ranges from moderate to moderately slow. These soils hold about 2 inches of available water per foot of soil, or about 10 inches to a depth of 5 feet. Runoff is slow, and the hazard of erosion is none to slight.

The soils in this unit are well suited to irrigation. They produce a wide variety of crops, including alfalfa, corn, small grains, sugarbeets, tomatoes, onions, and potatoes (fig. 5). Unirrigated wheat is grown in some areas. Peaches, apples, and pears grow well on these soils. Pasture plants are grown occasionally in rotation with other crops.

The most needed management is land leveling to a uniform grade so that irrigation water can be applied evenly. Where row crops are grown, the furrow method of irrigation is well suited. For alfalfa or other close-growing crops, the border method is better suited.

Good tilth can easily be maintained on these soils by plowing in the fall, by returning organic matter, and by avoiding tilling or trampling when the soils are wet. Crops generally respond to nitrogen, phosphate, or both, but the response depends on the kind of crop and the way the soil has been managed in the past.

CAPABILITY UNIT I–2 (IRRIGATED)

Kidman fine sandy loam, 0 to 1 percent slopes, is the only soil in this capability unit. It occurs on lake terraces and is nearly level, deep, and well drained or moderately well drained.

This soil is moderately high in fertility, is friable, and is easily tilled. From 1.5 to 4 percent of its surface layer is organic matter. This soil absorbs moisture readily and has moderate to moderately rapid permeability. Available water per foot of soil is about 1.5 inches, or about 7.5 to 8 inches to a depth of 5 feet. In moderately well drained areas, the water table fluctuates at depths between 40 to 60 inches. Runoff is slow.

This soil is well suited to irrigation. It produces a wide variety of irrigated crops, including alfalfa, small grains, sugarbeets, tomatoes, corn, and potatoes. Adequately drained areas are well suited to peaches, apricots, cherries, apples, and pears. Pasture plants are grown occasionally in rotation with other crops.

The most needed management is land leveling so that irrigation water can be distributed evenly. Well suited to close-growing crops is the border method of irrigation in which the length of runs ranges from about 300 to 700 feet. In furrow irrigation, runs ranging from about 300 to 600 feet are suitable.

Good tilth is easily maintained by returning organic matter and by avoiding tilling or trampling when the soil is too wet. It is advisable to plow in spring just before planting. Crops on this soil respond well to nitrogen, phosphate, or both, but the reponse depends on the kind of crop and the way this soil has been managed in the past.

CAPABILITY UNIT IIe–2 (IRRIGATED)

This capability unit consists of deep, well drained and moderately well drained, gently sloping loams on lake terraces, recent alluvial fans, and flood plains.

These fertile soils are friable, are easily tilled, and absorb moisture readily. From 2 to 5 percent of the loamy surface layer is organic matter. Permeability of the subsoil ranges from moderate to moderately slow. These soils hold about 2 inches of available water per foot of soil, or about 10 inches to a depth of 5 feet. Runoff is slow, and erosion is a slight hazard.

The soils in this unit are well suited to irrigation. They produce a wide variety of crops, including alfalfa, corn, small grains, sugarbeets, tomatoes, onions, and potatoes. Wheat is dryfarmed in small areas. Peaches, apples, and pears grow well on the well-drained soils of this unit, but drainage may be needed for these orchard fruits on the moderately well drained soils. Pasture plants are grown occasionally in rotation with other crops.

The most needed management is land leveling so that irrigation water can be distributed evenly. Because erosion is more likely on these soils than on the soils in capability unit I–1, greater care in applying water is needed. The length of runs ranges from about 250 to 500 feet for furrow irrigation and from about 500 to 650 feet for border irrigation.

Good tilth is easily maintained by plowing in fall, by returning organic matter, and by avoiding tilling or trampling when the soils are too wet. Crops generally respond to nitrogen, phosphate, or both, but the response depends on the kind of crop and the way the soils have been managed in the past.

CAPABILITY UNIT IIe–3 (IRRIGATED)

This capability unit consists of deep, well drained and moderately well drained, gently sloping loams on lake terraces.

These soils are friable, are easily tilled, and absorb moisture readily. From 1.5 to 4 percent of the loamy surface layer is organic matter. These soils hold about 1.5 inches of available water per foot of soil, or about 7.5 to 8 inches to a depth of 5 feet. Erosion is a slight hazard. The Pleasant View soil is gravelly in places, and the Kidman soil has a fluctuating water table at a depth of 40 to 60 inches.

The soils in this unit are well suited to irrigation. They produce a wide variety of crops, including alfalfa, small grains, sugarbeets, tomatoes, corn, and potatoes. Adequately drained areas are well suited to peaches, apricots, cherries, apples, and pears. Pasture plants are grown occasionally in rotation with other crops.

Figure 5.—Top: **Small grain on Parleys loam, 0 to 1 percent slopes.** *Bottom:* **Harvesting yellow Spanish onions on Timpanogos loam, 0 to 1 percent slopes. Both soils are in capability unit I–1.**

The most needed management is land leveling so that irrigation water can be distributed evenly. The length of runs ranges from about 200 to 350 feet for furrow irrigation and from about 300 to 400 feet for border irrigation.

Good tilth is easily maintained by plowing in fall, by returning organic matter, and by avoiding tilling or trampling when the soils are too wet. Crops generally respond to nitrogen, phosphate, or both, but the degree of response depends on the kind of crop and the way the soils have been managed in the past.

CAPABILITY UNIT IIw–1 (IRRIGATED)

Kirkham silty clay loam is the only soil in this capability unit. It is a deep, somewhat poorly drained, nearly level soil on flood plains.

This soil is moderately high in fertility. It is somewhat difficult to till and must be tilled within the proper range of moisture content. About 1.5 to 4 percent of the silty clay loam surface layer is organic matter. This soil has moderately slow permeability. It holds about 2 inches of available water per foot of soil, or about 10 inches to a depth of 5 feet. Depth to the water table ranges from 20 to 40 inches. Runoff is slow, and the hazard of erosion is slight.

Where it is adequately drained, this soil is well suited to irrigation. It is suited to a wide variety of irrigated crops, including alfalfa, corn, tomatoes, sugarbeets, small grains, and truck crops. Pasture plants are grown in rotation with other crops, but orchard fruits are not suited because of the high water table. Most of the acreage is cultivated, but some areas in native grass are grazed.

Drainage and the control of the water table are the most needed management practices. Open drains and tile are commonly used, but in many places they are not deep enough or they are clogged and do not function well. Special on-site investigation is needed to secure the best and most economical drainage. Other management needed is land leveling so that irrigation water can be applied evenly. Row crops are irrigated by the furrow method in which the length of runs ranges from about 450 to 900 feet. Close-growing crops are better irrigated by the border method in which the length of runs ranges from 650 feet to 900 feet.

Good tilth is easily maintained by plowing in fall, by returning organic matter, and by avoiding trampling or tilling when the soil is wet. Crops on this soil respond well to nitrogen, phosphate, or both, the response depending on the kind of crop and the way this soil has been managed in the past. A suitable cropping system consists of 3 years of grass-legume hay or pasture, followed by 1 year of corn or small grains, then 1 year of sugarbeets, and finally 1 or 2 years of truck crops.

CAPABILITY UNIT IIw–3 (IRRIGATED)

This capability unit consists of deep, somewhat poorly drained, nearly level loams, silt loams, and fine sandy loams on nearly level lake terraces, alluvial fans, and flood plains.

These fertile soils are friable, are easily tilled, and absorb moisture readily. From 2 to 10 percent of their surface layer is organic matter. Permeability of the subsoil and substratum is moderate to slow. These soils hold about 1.7 to 2 inches of available water per foot, or about 7.5 to 10 inches to a depth of 5 feet. Depth to the water table ranges from 24 to 40 inches. Runoff is slow, and the hazard of erosion is none to slight. The effect of salts and alkali on the Ironton, Sunset, and Warm Springs soils is moderate, but this effect is fairly easy to overcome by leaching after the soils are drained.

Where they are adequately drained, the soils of this unit are well suited to irrigation. They produce a wide variety of crops, including alfalfa, corn, small grains, sugarbeets, tomatoes, and truck crops. Orchard fruits are not generally grown, because the water table is high. Improved pasture is used in rotation with crops. These soils are used extensively for irrigated crops. A few areas are dryfarmed for wheat, and some areas in native grass are grazed.

Drainage and control of the water table are the main concerns of management. Open ditches and tile are commonly used. In many areas drainage is not adequate, because the drains are too shallow or they have clogged. Special investigation is needed before drains are installed to insure the best and most economical drainage. After the Ironton, Sunset, and Warm Springs soils have been drained in some areas, leaching is needed to remove excess salts and alkali. Adding gypsum or a large amount of organic matter hastens reclamation.

Other management needed is land leveling so that irrigation water can be distributed evenly. Well suited to row crops is the furrow method of irrigation in which the length of runs ranges from about 400 to 800 feet. The border method is suitable for close-growing crops, and the length of runs should range from about 500 to 700 feet.

Good tilth is easily maintained by plowing in fall, by returning organic matter, and by avoiding tilling and trampling when the soils are too wet. For maintaining favorable yields, fertilizer is generally needed in addition to available manure and plant residue. Crops on these soils respond to nitrogen, phosphate, or both, but the response depends on the kind of crop and the way the soils have been managed in the past. A suitable cropping system consists of 3 years of grass-legume hay, followed by 1 year of corn, then 1 year of sugarbeets, and finally 1 year of truck crops.

CAPABILITY UNIT IIw–4 (IRRIGATED)

This capability unit consists of deep, somewhat poorly drained, nearly level to gently sloping loams, silt loams, and fine sandy loams on lake terraces, alluvial fans, and flood plains. Draper gravelly loam is about 20 to 35 percent gravel, by volume.

These fertile soils are friable, are easily tilled, and absorb moisture readily. From 2 to 10 percent of their surface layer is organic matter. Permeability of the subsoil and substratum are moderate to slow. These soils hold about 1.7 to 2 inches of available water per foot, or about 7.5 to 10 inches to a depth of 5 feet. Depth to the water table ranges from 24 to 40 inches. Runoff is slow, and the hazard of erosion is slight. The effect of salts and alkali on the Ironton, Sunset, and Warm Springs soils is moderate, but this effect is fairly easy to overcome by leaching after the soils have been drained.

Where they are adequately drained, the soils in this unit are well suited to irrigation. They produce a wide variety of crops, including alfalfa, corn, small grains, sugarbeets, tomatoes, and truck crops. Orchard fruits are not generally grown, because the water table is high. Improved pasture is used in rotation with crops. These soils are used extensively for irrigated crops. A few areas are dryfarmed for wheat, and some areas in native grass are grazed.

Drainage and the control of the water table are the main concerns of management. Some land leveling is needed so that irrigation water can be distributed evenly. Because the soils are more sloping than those in capability unit IIw–3, greater care is needed in applying irrigation water. Also needed are shorter irrigation runs and smaller irrigation streams. For furrow irrigation,

runs should range from about 275 to 500 feet; for border irrigation, 450 to 600 feet.

CAPABILITY UNIT IIw–5 (IRRIGATED)

Syracuse loamy fine sand is the only soil in this capability unit. It is deep, somewhat poorly drained, and slightly to strongly affected by salts and alkali. This nearly level soil occurs on low lake terraces.

This soil is friable and easily tilled. About 1 to 2 percent of its surface layer is organic matter. The subsoil and substratum have moderate to rapid permeability. This soil holds about 1.3 inches of available water per foot, or about 6.5 inches to a depth of 5 feet. Depth to the water table ranges from 24 to 48 inches. The hazard of erosion is none to slight.

Where it is drained and reclaimed from salts and alkali, this soil is well suited to irrigation. It is also well suited to alfalfa, small grains, sugarbeets, corn, tomatoes, and improved pasture. Most of the acreage is cultivated and used for general irrigated crops.

Much of the acreage in this unit has been drained and reclaimed. In these areas the water table is below a depth of 3 feet most of the time. Management is needed in these areas to maintain good drainage and to leach the soil annually, which prevents the accumulation of salts and alkali. Undrained areas and areas that are affected by salts and alkali need to be drained and reclaimed. Adding gypsum and a large amount of manure hastens reclamation. Other management needed is land leveling so that irrigation water can be distributed evenly. For close-growing crops, the border method of irrigation is well suited, and the length of runs should be about 300 to 450 feet. Furrow irrigation is better for row crops, and the length of runs ranges from about 225 to 400 feet.

A good cropping system for the soil in this unit is alfalfa grown for 3 or 4 years, followed by corn for 1 year, then sugarbeets for 1 year, and finally tomatoes or small grains for 1 year. Crops respond well to large additions of manure and fertilizer. Nitrogen is needed each year on improved pasture, corn, small grains, and sugarbeets. Phosphate is needed every 2 to 4 years and should be applied according to the results of soil tests.

CAPABILITY UNIT IIs–2 (IRRIGATED)

This capability unit consists of deep and moderately deep, moderately well drained, nearly level loamy fine sands, fine sandy loams, and loams on the flood plain of the Weber River. The Sunset loam has a gravelly substratum at a depth of 25 to 36 inches.

These moderately fertile soils are friable, are easily tilled, and absorb moisture readily. From 1.5 to 6 percent of the surface layer is organic matter. Permeability of the subsoil ranges from moderately rapid to rapid. These soils hold about 1.2 inches of available water per foot, or about 5 to 7 inches to a depth of 5 feet. In places the water table fluctuates between depths of 40 to 60 inches. Runoff is slow, and the hazard of erosion is slight.

The soils in this unit are fairly well suited to irrigation, and about 50 percent of the acreage is used for irrigated crops. These soils produce a wide variety of crops, including alfalfa, corn, small grains, potatoes, sugarbeets, and tomatoes. Improved pasture is used in rotation with crops.

In some places the soils in this unit are in native vegetation that consists of cottonwood and boxelder trees, bunch grasses, and cheatgrass brome. In these places the soils are used for grazing, but if they were cleared and leveled, they would be suited to cultivated crops.

Unless sprinklers are used, the most needed management is land leveling so that irrigation water can be distributed evenly. The border method of irrigation is used for close-growing crops, and the length of runs ranges from about 300 to 450 feet. Where row crops are grown, the furrow method is well suited, and the length of runs ranges from about 250 to 500 feet. These soils are well suited to sprinklers, especially in undulating areas. Water can be applied by sprinklers at the rate of about 0.7 inch to 1.5 inches per hour. Drainage is needed in some areas.

A suitable cropping system consists of 4 or 5 years of grass-legume hay or pasture, followed by 1 year of small grains or corn, then 1 year of sugarbeets or tomatoes, and finally 1 or 2 years of small grains or truck crops.

Good tilth is easily maintained by plowing either in spring or fall, and by returning organic matter regularly. To maintain favorable yields, fertilizer is needed in addition to any available barnyard manure. Crops respond to nitrogen, phosphate, or both, depending on the kind of crop and the way the soils have been used in the past.

CAPABILITY UNIT IIIe–2 (IRRIGATED)

This capability unit consists of deep, well drained and moderately well drained, moderately sloping soils on lake terraces and alluvial fans. The surface layer of these soils is loam, fine sandy loam, or gravelly loam.

These highly fertile soils are friable, are easily tilled, and absorb water readily. From 2 to 5 percent of their surface layer is organic matter. Permeability of the subsoil and substratum is moderately rapid to moderately slow. Runoff is medium, and the hazard of erosion is moderate. These soils hold about 1.5 to 2 inches of available water per foot of soil, or about 7.5 to 10 inches to a depth of 5 feet. Pleasant View gravelly sandy loam, 3 to 6 percent slopes, is in this unit and has a gravelly subsoil and substratum.

The soils in this unit are used mainly for irrigated crops, but some small areas are used for dryfarmed wheat. These soils are well suited to improved pasture or hay crops and are fairly well suited to peaches, pears, apricots, cherries, and apples. Slopes are too strong for row crops.

The main concern of management is the control of erosion. Where irrigation depends on gravity, intensive practices are needed for controlling water. Irrigation by flooding from cross-slope ditches or corrugations is suitable for pasture and hay crops. The length of runs ranges from about 100 to 125 feet for irrigation by flooding, and from about 125 to 250 feet for irrigation by furrows or corrugations. Orchards are generally laid out so that they can be irrigated by contour furrows. These soils are well suited to sprinkler irrigation. The rate of applying water ranges from 0.4 to 0.7 inch per hour.

A good cropping system for the soils of this unit is grass-legume pasture or hay grown for 5 or 6 years and followed by small grains for 2 years. For high yields,

improved pasture usually requires additions of nitrogen every year and of phosphate every 2 to 4 years. Trees in orchards are also benefited by additions of nitrogen. If these soils are dryfarmed, practices are needed that leave the maximum amount of crop residue on the surface for protection against erosion.

CAPABILITY UNIT IIIe-3 (IRRIGATED)

This capability unit consists of deep, well drained and moderately well drained, loamy soils on the higher terraces and alluvial fans. Slopes range from 6 to 10 percent.

These loamy soils are friable and easily tilled. The surface layer ranges from silt loam to fine sandy loam and is about 2 to 5 percent organic matter. Permeability of the subsoil ranges from moderate to moderately slow. These soils hold about 1.5 to 2 inches of available water per foot, or about 7.5 to 10 inches to a depth of 5 feet. Runoff is medium to rapid, and the hazard of erosion is moderate to high. Permeability of the substratum of the Pleasant View and of the Kidman soils in this unit is moderately rapid.

The soils in this unit are used mainly for irrigated crops, but some areas are dryfarmed. Where they are irrigated, these soils are well suited to peaches, apricots, cherries, pears, and apples. They are also well suited to improved irrigated pasture plants, but because of strong slopes, they are not suited to row crops.

The main concern of management is the control of erosion. Where irrigation depends on gravity, practices are needed for controlling water. Light, frequent irrigations are suitable for pasture plants. For close-growing crops, irrigation by flooding from cross-slope ditches or corrugations is commonly used, and the length of runs ranges from 125 to 200 feet. Orchards are irrigated by contour furrows. In these orchards, cover crops are needed between the trees. Other irrigated areas of these soils should be kept in a mixture of grasses and legumes for hay or in pasture most of the time. A good mixture for pasture consists of smooth brome, ladino clover, tall oatgrass, orchardgrass, and alfalfa. Crops on these soils respond well to fertilizer. Nitrogen is needed every year on pastures and orchards. Phosphate should be added every 2 to 4 years, depending on the kind of crop and on the results of soil tests.

If the soils of this unit are dryfarmed, management is needed that leaves the maximum amount of crop residue on the surface for protection against erosion.

CAPABILITY UNIT IIIw-1 (IRRIGATED)

This capability unit consists of deep, somewhat poorly drained loams, gravelly loams, and silt loams on lake terraces, alluvial fans, and flood plains. The Draper gravelly loam has a gravelly subsoil. Slopes range from 3 to 6 percent.

These fertile soils are friable, are easily tilled, and absorb moisture readily. From 2 to 10 percent of their surface layer is organic matter. Permeability of the subsoil and substratum is moderate to slow. These soils hold about 1.7 to 2 inches of available water per foot, or about 7.5 to 10 inches to a depth of 5 feet. Depth to the water table ranges from 36 to 50 inches. Runoff is slow, and the hazard of erosion is slight to moderate.

In most places the soils of this unit are drained and used mainly for irrigated crops, but some small areas are dryfarmed for wheat or are grazed. These soils are well suited to improved pasture plants, to a mixture of grasses and legumes for hay, and to small grains. They are not suited to orchard fruits or to row crops.

The main concerns of management are drainage and the use of irrigation water without causing erosion. Open ditches and tile are commonly used. Before drains are installed, special investigation is needed to insure the best and most economical drainage. If irrigation depends on gravity, intensive practices for controlling water are needed. Irrigation by flooding from cross-slope ditches or corrugations is suitable for pasture and hay crops. The length of runs for flooding ranges from 100 to 125 feet. The soils in this unit are well suited to irrigation by sprinklers. The rate for applying water by sprinklers ranges from 0.4 to 0.7 inch per hour.

A good cropping system for the soils of this unit is 5 or 6 years of a grass-legume hay or pasture, followed by 2 years of small grains. For above-average yields, nitrogen is needed every year on improved pasture or hay, and phosphate is needed every 2 to 4 years.

CAPABILITY UNIT IIIw-2 (IRRIGATED)

This capability unit consists of deep, poorly drained, nearly level loams, silt loams, and silty clay loams on low lake terraces, stream flood plains, and alluvial fans.

These fertile soils are friable, and they absorb water readily. From 4 to 20 percent of their surface layer is organic matter. Permeability of the subsoil ranges from moderate to very slow. Except in areas that have been partially drained, depth to the water table generally ranges from 10 to 24 inches. The soils in this unit hold about 2 to 2.3 inches of water per foot, or about 10 to 12 inches to a depth of 5 feet. Runoff is slow, and the hazard of erosion is none to slight.

Unless these soils are drained, they are not suitable for cultivated crops. Much of the acreage is in irrigated native plants that are grazed or cut for hay. Where these soils are drained, they are well suited to irrigated crops, such as corn, small grains, sugarbeets, and vegetables. Improved pasture plants and alfalfa are grown in rotation with other crops.

The main concerns of management are draining, land leveling, and distributing irrigation water evenly. Open ditches and tile are used for draining, but special investigations are needed to insure the best and most economical drainage. Areas where salts and alkali occur are benefited by an occasional leaching with irrigation water. Suitable for close-growing crops is the border method of irrigation in which the length of runs ranges from 500 to 700 feet. Where row crops are grown, the furrow method of irrigation is well suited, and the length of runs ranges from about 400 to 700 feet.

A suitable cropping system for soils in this unit consists of 3 years of grass-legume hay or pasture, followed by 1 year of corn, then 1 year of sugarbeets, and finally 1 or 2 years of truck crops. Crops on these soils respond well to additions of fertilizer. Nitrogen, phosphate, or both, are used, depending on the kind of crop and the way the soils have been used in the past.

CAPABILITY UNIT IIIw-4 (IRRIGATED)

This capability unit consists of deep, somewhat poorly drained and poorly drained, nearly level silt loams that

are moderately to strongly affected by salts and alkali. These soils occur on low lake terraces and flood plains near the lake plain.

About 1 to 5 percent of the surface layer is organic matter. Permeability of the subsoil and substratum ranges from moderate to very slow. These soils hold about 1.8 inches of available water per foot, or about 8 to 9 inches to a depth of 5 feet. In most places depth to the water table ranges from 20 to 48 inches. Alkali is generally weak and not harmful in the surface layer but it is moderate to strong in the subsoil and substratum.

Most of the acreage of soils in this unit is in native vegetation consisting mainly of saltgrass and alkali sacaton and is used for grazing. Some areas have been drained and partially reclaimed from salts and alkali and are used for irrigated crops. Where they are drained and reclaimed, these soils are also suited to irrigated improved pasture grown in a rotation with corn or small grains.

Draining these soils and reclaiming them from salts and alkali are the main concerns of management. Special investigations are needed to determine the feasibility of drainage and the design for a drainage system. These soils require leaching with irrigation water several times at the beginning of reclamation, and once each year thereafter, so as to keep the concentration of salts low. Leaching of salts and alkali can be hastened by adding gypsum and barnyard manure. Land leveling so that irrigation water can be distributed evenly is also needed. For pasture and other close-growing plants, the border method of irrigation is suitable. The length of runs ranges from about 600 to 800 feet. For row crops, furrow irrigation is suitable, and the length of runs ranges from about 400 to 800 feet.

Keeping these soils in good tilth is difficult. Plowing in fall is needed, and tilling and trampling when the soil is wet should be avoided. Adding barnyard manure and plowing under green-manure crops help to improve tilth and also supplies plant nutrients. For above-average yields, nitrogen, phosphate, or both, are needed. Nitrogen added each year benefits pasture plants and small grains, and phosphate added every 2 to 4 years benefits alfalfa and grass-legume hay.

CAPABILITY UNIT IIIw–5 (IRRIGATED)

This capability unit consists of deep, somewhat poorly drained silt loams that are on low lake terraces and that are moderately affected by alkali. Slopes range from 1 to 6 percent.

About 1.5 to 4 percent of the surface layer of these soils is organic matter. Permeability of the subsoil is slow to very slow. In most places the water table is at a depth of about 40 inches. The effect of alkali is moderate in the subsoil and substratum, but it is weaker in the surface layer and generally is not harmful. These soils hold about 1.8 inches of available water per foot, or about 8 to 9 inches to a depth of 5 feet.

Most of the acreage in this unit is cultivated, but some areas in native grasses are grazed. The areas cultivated are used mainly for irrigated crops, but some are dryfarmed. Where they are drained and reclaimed from alkali, these soils are well suited to irrigated improved pasture grown in rotation with corn or small grains.

Draining these soils and reclaiming them from alkali are the main concerns of management, but land leveling so that irrigation water can be distributed evenly is also important. Investigations at the site are needed to determine the feasibility of drainage. Alkali can be leached away by flooding the soils with irrigation water after leveling. Both the furrow and border methods of irrigation can be used, but the length of runs needs to be shorter than those on the soils in capability unit IIIw–4 because slopes are stronger. The length of runs for furrow irrigation should range from about 275 to 500 feet; for border irrigation, the range should be from about 500 to 600 feet.

CAPABILITY UNIT IIIw–6 (IRRIGATED)

This capability unit consists of deep, somewhat poorly drained, nearly level loams, loamy fine sands, and fine sandy loams that are moderately or strongly affected by salts and alkali. These soils occur on low lake terraces and flood plains.

These soils are friable and easily tilled. About 1 to 5 percent of their surface layer is organic matter. Permeability of the subsoil and substratum is moderate to slow. In most places depth to the water table ranges from 20 to 48 inches. After they are reclaimed from salts and alkali, these soils hold about 1.7 inches of available water per foot, or about 8 inches to a depth of 5 feet. Runoff is slow, and the hazard of erosion is none to slight.

Most of the acreage in this unit is in native vegetation consisting mainly of saltgrass and alkali sacaton and is used for grazing. Some areas are cultivated and used for irrigated crops. Where they are drained and reclaimed from salts and alkali, these soils are suited to irrigated pasture or grass-legume hay crops grown in rotation with corn or small grains.

Draining these soils and reclaiming them from salts and alkali are the main concerns of management. Special investigations are needed to determine the feasibility of drainage and the design of a drainage system. Leaching with irrigation water is needed several times at the beginning of reclamation and once each year thereafter to keep concentration of salts and alkali low. Additions of gypsum and barnyard manure hasten reclamation. Land leveling so that irrigation water can be distributed evenly is also important. For pasture and other close-growing plants, the border method of irrigation is well suited. The length of runs ranges from about 500 to 700 feet. For row crops, furrow irrigation is better, and the length of runs ranges from about 300 to 650 feet.

Crops on these soils respond well to nitrogen, phosphate, or both, depending on the kind of crop and the way the soils have been used in the past. Nitrogen is needed annually on pasture plants and corn, and phosphate is needed every 2 to 4 years on grass-legume hay crops.

CAPABILITY UNIT IIIw–8 (IRRIGATED)

Cudahy silt loam, 0 to 3 percent slopes, is the only soil in this capability unit. It is poorly drained, for it has a lime-cemented hardpan, generally at a depth of 20 to 40 inches. In a few small areas, the hardpan is at

a depth of 10 to 20 inches. This soil is in depressions on low lake terraces. Although slopes range from 0 to 3 percent, in most places they are less than 1 percent.

This soil is friable and easily tilled. From 4 to 12 percent of its black surface layer is organic matter. Permeability of the subsoil is moderate to slow. In most places the hardpan is strongly cemented and ranges from about 2 to 12 inches in thickness. Depth to the water table, which is usually below the hardpan, ranges from 20 to 40 inches. This soil holds about 2.2 inches of available water per foot of soil above the hardpan, or about 4 to 6 inches to the depth of the pan. Runoff is slow, and the hazard of erosion is none to slight. In places this soil is moderately affected by salts and alkali, but they are readily leached away after the soil has been drained.

Part of the acreage of this soil is used for irrigated crops, and part is used for irrigated native pasture. Where it is drained, this soil is fairly well suited to irrigation. It produces improved pasture, grass-legume hay crops, and truck crops, particularly cabbage, celery, and onions.

The main concerns of management are draining this soil and leveling it so that irrigation water can be distributed evenly. Special investigations are needed to determine the feasibility of drainage and the design of a suitable drainage system. In land leveling, cuts must not be deep enough to expose the hardpan. Irrigation should be light enough to avoid a perched water table above the pan. For close-growing crops, the border method of irrigation is suitable. Length of runs ranges from about 250 to 400 feet. For row crops, the furrow method is better, and the length of runs ranges from about 200 to 350 feet.

A suitable cropping system for this soil is 4 to 6 years of improved pasture or grass-legume hay crops, followed by 1 year of small grains, and then 2 or 3 years of truck crops.

Crops on this soil respond to added fertilizer. Additions of nitrogen are needed every year on improved pasture, and additions of phosphate are needed every 2 to 4 years. Both nitrogen and phosphate are needed annually on truck crops.

CAPABILITY UNIT IIIs–1 (IRRIGATED)

This capability unit consists of nearly level, somewhat excessively drained to moderately well drained sandy loams and fine sandy loams on terraces, alluvial fans, and flood plains.

Permeability of these soils is moderately rapid to rapid. About 1 to 3 percent of their surface layer is organic matter. These soils have a gravelly sandy loam subsoil and in most places are very gravelly below a depth of 18 to 24 inches. They hold about 1.2 to 1.5 inches of available water per foot to a depth of about 2 feet, but the very gravelly substratum holds only about 0.5 inch per foot. Consequently, the available water held to a depth of 5 feet is about 3.75 to 4.5 inches. Runoff is slow, and the hazard of erosion by water is none to slight. The hazard of soil blowing, however, is slight to severe.

Some of the acreage in this unit is cultivated and used for irrigated or dryfarmed crops; some is used for grazing; and some is used for community developments. The cultivated soils are well suited to improved pasture plants, and they are also suited to orchard fruits and other crops, including alfalfa, corn, tomatoes, sugarbeets, potatoes, and small grains.

The most needed management is efficient use of irrigation water. Sprinklers give the best results, and the rate of application ranges from 0.7 inch to 1.5 inches per hour. Where the soils are leveled to a uniform grade, the gravity method can be used. Frequent light irrigations are better than less frequent heavy ones. For close-growing crops, the border method of irrigation is suitable, and the length of runs ranges from about 300 to 600 feet. The furrow method is suitable for row crops, and the length of runs ranges from about 225 to 500 feet. Cover crops are needed between trees in orchards. They are also needed on cultivated soils that otherwise would remain bare during the winter. Spring plowing is preferable to fall plowing.

Large applications of fertilizer are needed for above-average yields. Nitrogen is needed every year for all crops except alfalfa, tomatoes, sugarbeets, and truck crops. Phosphate should be added according to the results of soil tests.

CAPABILITY UNIT IIIs–2 (IRRIGATED)

This capability unit consists of nearly level to gently sloping, somewhat excessively drained to moderately well drained loamy fine sands, sandy loams, and gravelly sandy loams on terraces, fans, and deltas.

Permeability of these soils is rapid or very rapid. About 1 to 3 percent of their surface layer is organic matter. The subsoil is gravelly sandy loam or loamy sand. These soils hold about 3.75 to 4.5 inches of available water to a depth of 5 feet. Runoff is slow, and the hazard of erosion by water is slight to moderate. The hazard of soil blowing is slight to severe.

Some of the acreage in this unit is used for irrigated or dryfarmed crops, some is used for grazing, and some is used for community developments. The cultivated soils are well suited to improved pasture plants, but they are also suited to orchard fruits and other crops, including alfalfa, corn, tomatoes, sugarbeets, potatoes, and small grains.

The most needed management is efficient use of irrigation water. Sprinklers give the best results, but if the soils are leveled, border and furrow irrigation can be used. The border method is suitable for close-growing crops, and the furrow method is better for row crops. Cover crops are needed between trees in orchards and on cultivated soils that otherwise would remain bare during winter.

CAPABILITY UNIT IIIs–3 (IRRIGATED)

This capability unit consists of somewhat excessively drained and moderately well drained loamy fine sands, sandy loams, and gravelly sandy loams on terraces and alluvial fans. Slopes range from 3 to 6 percent.

These soils are mainly friable. Tillage is moderately difficult on the gravelly soils but is fairly easy on the nongravelly soils. About 1 to 3 percent of the surface layer of these soils is organic matter. The Kilburn soils have a gravelly subsoil and substratum, but the Francis and Layton soils are nongravelly throughout. Runoff is slow to medium. Water erosion is a moderate hazard

on all of these soils, and soil blowing is a slight to moderate hazard on the Francis and Layton soils. These soils generally hold from 1 inch to 1.5 inches of available water per foot, or about 5 inches to a depth of 5 feet. An exception is the gravelly or cobbly substratum of the Kilburn soils, which holds only 0.5 to 0.7 inch per foot.

The soils in this unit are used mainly for irrigated crops, but some are grazed, and some are used for community developments. These soils are well suited to peaches, apricots, cherries, improved pasture, and grass-legume hay. Because they are moderately sloping, these soils are not suited to row crops.

Efficient use of irrigation water and the control of erosion are the main concerns of management. Sprinklers give the best results, and the rate of application ranges from 0.5 to 1 inch of water per hour. Where irrigation depends on gravity, intensive practices to control erosion are needed. Orchards can be irrigated efficiently by contour furrows, and pasture and hay crops from cross-slope ditches or corrugations. Length of runs for corrugations ranges from about 100 to 175 feet. The length of runs for flooding ranges from about 75 to 100 feet. Cover crops are needed between trees in orchards.

Large applications of fertilizer are needed for above-average yields. Nitrogen is needed every year for most crops, and phosphate is needed every 2 to 4 years, depending on the kind of crop and the way the soils have been managed in the past.

CAPABILITY UNIT IVe-4 (IRRIGATED)

This capability unit consists of deep, well-drained, moderately steep soils of the higher terraces and alluvial fans. The soils are loams, silt loams, fine sandy loams, and very fine sandy loams. Most of them are moderately eroded.

The soils of this unit are friable and easily worked. About 2 to 5 percent of their surface layer is organic matter. Permeability of the subsoil ranges from moderate to moderately slow. These soils hold about 1.5 to 2 inches of available water per foot of soil, or about 7.5 to 10 inches to a depth of 5 feet. Runoff is medium to rapid, and the hazard of erosion is moderate to high.

These soils are used mostly for grazing, but some areas are cultivated. Improved pasture or orchards irrigated by sprinklers are better suited than cultivated crops. Some cultivated areas are irrigated and some are dryfarmed, but row crops are not suited. Close-growing crops can be grown occasionally.

The principal concern of management is the control of erosion. The soils are too steep for gravity irrigation, except where irrigation is on the contour or across the slope. If gravity methods are used, intensive practices are needed to control water. Results from sprinklers are better. The safe rate of applying water by sprinklers is 0.15 to 0.3 inch per hour.

If these soils are used for orchards, cover crops are needed for protection between the trees. In irrigated areas other than orchards, a cover of grass-legume hay or pasture is needed most of the time. A good pasture mixture is smooth brome, ladino clover, tall oatgrass, orchardgrass, and alfalfa. Nitrogen is needed every year on pasture and in orchards. Depending on the crop, phosphate is needed every 2 to 4 years. If these soils are dryfarmed, a maximum amount of crop residue should be left on the surface for protection against erosion.

CAPABILITY UNIT IVw-1 (IRRIGATED)

This capability unit consists of deep, very poorly drained, nearly level soils in depressions on flood plains and low terraces. These soils have a water table that is at or near the surface most of the time. They are affected by salts and alkali. The surface layer of these soils is silty clay loam, silt loam, or fine sandy loam.

In the Logan and Roshe Springs soils, from 4 to 20 percent of the surface layer is organic matter. In the Warm Springs soil, which has only a small acreage in this unit, from 1 to 2.5 percent of the surface layer is organic matter. Permeability of the subsoil is moderate to very slow in the Logan and Roshe Springs soils and moderate in the Warm Springs soil. All of these soils have moderately high to moderate fertility. After the salts have been removed, they hold about 1.7 to 2.3 inches of available water per foot, or about 9 to 12 inches to a depth of 5 feet. Runoff is slow, and the hazard of erosion is none to slight.

Most of the acreage of the soils in this unit is used for grazing or as a wildlife refuge. These soils are not suitable for cultivation without drainage. After they are drained, they are suited to improved pasture and some kinds of truck crops.

Draining these soils and reclaiming them from salts and alkali are the most needed management. Because these soils are low and outlets are few or nonexistent, drainage pumping plants are needed in most places. These plants included pumps, motors, and auxiliary equipment. Special on-site investigations are needed, however, to insure selection of the best and most economical drainage system. After these soils are drained, land leveling is needed so that irrigation water can be distributed evenly. The border method of irrigation is suitable for close-growing crops. Length of runs ranges from about 500 to 700 feet. Where row crops are grown, the furrow method is well suited, and the length of runs ranges from about 400 to 700 feet.

A suitable cropping system for these soils consists of 4 to 6 years of improved pasture, followed by 1 year of corn or small grains, and then 1 or 2 years of truck crops.

CAPABILITY UNIT IVw-3 (IRRIGATED)

This capability unit consists of somewhat poorly drained and poorly drained, nearly level soils affected by salts and alkali. These soils occur on lake terraces, in depressions on lake terraces, and on flood plains.

The surface layer of these soils is silty clay loam, loam, or silt loam. From 1 to 4 percent of this layer is organic matter. Permeability of the subsoil is slow or very slow. The Ford soils have a weakly to strongly cemented hardpan at a depth of about 20 to 36 inches that ranges from 3 to 40 inches in thickness. In most places the water table occurs between a depth of 20 and 40 inches, but in the poorly drained soils it is at or near the surface most of the time. The effect of salts and alkali ranges from slight to strong. After the salts have been removed, most of these soils hold about 1.8 inches of available water per foot, or about 8 or 9 inches to a depth of 5 feet. The Ford soils, however, hold only

about 4 to 5 inches of available water above the hardpan. Roots rarely penetrate the pan. Runoff is slow, and the hazard of erosion is slight.

Most of the acreage of the soils in this unit is used as irrigated unimproved pasture. The vegetation is dominantly saltgrass. Where these soils are drained and partially reclaimed from salts and alkali, they are suited to irrigated improved pasture, and to small grains grown occasionally.

Draining these soils and reclaiming them from salts and alkali are the most important concerns of management. Draining the Ford soils is difficult because of the hardpan; draining the other soils is difficult because they are low. Special on-site investigations are needed to determine the feasibility of both drainage and reclamation. After these soils are drained, land leveling is needed so that irrigation water can be distributed evenly. The border method of irrigation gives best results. Length of runs ranges from about 500 to 700 feet. Leaching with irrigation water is needed several times at the beginning of reclamation and once each year thereafter to keep the concentration of salts low. Adding gypsum and manure hastens reclamation.

These soils should be plowed in fall to help keep them in good tilth. A good cropping system for these soils is 4 to 6 years of grass-legume pasture or hay crops, followed by 1 or 2 years of corn or small grains. A suitable mixture for pasture is tall wheatgrass or tall fescue and sweetclover.

Fertilizer is needed in addition to any available manure to maintain above-average yields. Nitrogen is needed every year and phosphate every 2 to 4 years, depending on the kind of crop and the way the soils have been managed in the past.

CAPABILITY UNIT IVs–1 (IRRIGATED)

This capability unit consists of well-drained and somewhat excessively drained, nearly level and gently sloping gravelly sandy loams and gravelly fine sandy loams on stream terraces and flood plains.

About 1 to 3 percent of the gravelly surface layer is organic matter. Below the surface layer, the amount of gravel increases with depth. The material below a depth of 18 to 24 inches consists mainly of pebbles, cobbles, and sand. Permeability of the subsoil is rapid or very rapid. These soils hold about 0.7 inch of available water per foot, or about 3 to 3.5 inches to a depth of 5 feet. Runoff is slow, and the hazard of erosion is slight. In some places the Steed soils in this unit are adjacent to the Weber River and are flooded occasionally.

Most of the acreage of soils in this unit is used for cultivated crops, but some areas are used for community developments and other areas as a source of commercial sand and gravel. The cultivated soils are suited to irrigated improved pasture and are fairly well suited to alfalfa, tomatoes, small grains, berries, and other crops.

The main concern of management is efficient use of irrigation water. Sprinklers are most efficient for irrigation, especially in uneven areas. Applications should be light and frequent. Gravity irrigation can be used, provided the soils have a smooth surface and a uniform grade. On the soils of this unit, the border method is used for close-growing crops. Length of runs ranges from about 200 to 300 feet.

A suitable cropping system is 4 to 6 years of grass-legume hay crops or pasture, followed by 1 or 2 years of small grains or tomatoes.

Large amounts of fertilizer are needed to maintain above-average yields. For pasture, nitrogen is needed every year early in spring and again about midsummer. Phosphate is needed every 2 to 4 years, depending on the kind of crop and the way the soil has been managed in the past.

CAPABILITY UNIT IVs–2 (IRRIGATED)

This capability unit consists of sandy, gravelly, and cobbly, well-drained and somewhat excessively drained, gently sloping to strongly sloping soils on terraces and fans.

From 1 to 4 percent of the surface layer is organic matter. Permeability of the subsoil is rapid or very rapid. These soils hold about 0.7 to 1 inch of available water per foot, or about 3 to 4 inches to a depth of 5 feet. Only about 0.5 inch of water is held in the gravelly and cobbly subsoils. Runoff is moderate to slow, and the hazard of erosion is moderate.

The Kilburn, Marriott, calcareous variant, and Sterling soils are gravelly or cobbly throughout their profile. Below the surface layer, they become more gravelly with depth, and below a depth of about 20 inches they consist mainly of gravelly or cobbly sand. The Francis and Layton soils are not gravelly.

Some areas of these soils are used for irrigated crops, some for grazing, and some for community developments. Cultivated areas are suited to cherry, apricot, and peach orchards and to irrigated improved pasture or grass-legume hay. The cobbly soils are difficult to till.

Controlling erosion and using irrigation water efficiently are the most important concerns of management. Sprinkler irrigation is most efficient; the rate of applying water ranges from 0.3 to 0.7 inch per hour. Where irrigation depends on gravity, intensive practices are needed for controlling erosion. All the acreage of these soils that is not in orchards, should be kept in permanent improved pasture or hay.

Large applications of fertilizer are needed to maintain above-average yields. Nitrogen is needed on orchards every year. On improved pasture, nitrogen is needed every year, and phosphate is needed every 2 or 3 years.

CAPABILITY UNIT IVs–3 (IRRIGATED)

This capability unit consists of well-drained and somewhat excessively drained, strongly sloping to moderately steep, loamy sands, gravelly sandy loams, and cobbly loams. Except for steeper slopes and a higher risk of erosion, these soils are similar to those in capability unit IVs–2.

Most of the acreage in this unit is used for grazing and watersheds. The vegetation consists dominantly of sagebrush, bluebunch, wheatgrass, sand dropseed, threeawn, and Indian ricegrass. Some areas are cultivated and used for orchards; other areas are used for improved pasture. These soils are well suited to orchards, but a permanent cover of vegetation is needed between the trees. They are also well suited to improved pasture.

Controlling erosion and using irrigation water efficiently are the main concerns of management. Sprinkler irrigation is most efficient and a safe rate of applying

water is 0.3 to 0.5 inch per hour. These soils are too steep for the use of gravity irrigation, except by contour furrows. These soils should be kept under permanent cover most of the time.

Fertilizer is needed to maintain above-average yields. Nitrogen is needed for fruit trees, and both nitrogen and phosphate are needed for improved pasture. The nitrogen is needed every year and phosphate every 2 to 4 years.

CAPABILITY UNIT IVs–4 (IRRIGATED)

This capability unit consists of deep, well-drained and excessively drained loamy fine sands and fine sands. These soils are duned in places.

About 0.3 to 1.5 percent of the surface layer is organic matter. The subsoil is loose fine sand or loamy fine sand and has rapid or very rapid permeability. These soils absorb water readily. They hold about 0.7 inch to 1.2 inches of available water per foot of soil, or about 3.5 to 6 inches to a depth of 5 feet. Water erosion is a slight to moderate hazard, but the hazard of soil blowing is high.

Most of the acreage in this unit is used for grazing. The native vegetation is dominantly sand dropseed and Indian ricegrass. Some areas are cultivated and used for sprinkler irrigated orchards and vineyards. Where sprinkler irrigation is available, these soils are well suited to improved pasture and to orchards.

Controlling soil blowing and using irrigation water efficiently are the main concerns of management. Sprinkler irrigation is generally needed, because land leveling for gravity irrigation is not practical in most areas. The rate at which water can be applied ranges from 0.5 to 1 inch per hour. Light frequent applications are better than heavy applications at longer intervals. Cover crops are needed between the trees in orchards. Vineyards should be planted in rows that are at right angles to the prevailing winds, and all bare surfaces should be kept moist. Areas not in orchards or vineyards should be kept in irrigated improved pasture or grass-legume hay most of the time.

Fertilizer is required to maintain above-average yields. Nitrogen is needed on pasture every year, once in spring and again about midsummer. It is needed on orchards every year. Phosphate is needed every 2 to 4 years.

CAPABILITY UNIT VIe–1

This capability unit consists of deep, well-drained, moderately steep to steep, eroded soils. These soils occur on high lake terraces and terrace escarpments. Slopes range from 10 to 30 percent.

These soils are friable and are easily tilled. Organic matter makes up about 2 to 5 percent of the surface layer in the Timpanogos and Parleys soils and 1 to 3 percent in the Hillfield, Kidman, and Pleasant View soils. Permeability of the subsoil is moderate to moderately slow. These soils hold about 1.5 to 2 inches of available water per foot of soil, or about 7.5 to 10 inches to a depth of 5 feet. The hazard of erosion is high. In some places much of the original surface soil has been removed by erosion from the Hillfield and Pleasant View soils. Gullies too deep to be crossed by tillage equipment frequently occur in some areas of the Pleasant View soils.

Nearly all the acreage in this unit is used for watersheds or for grazing. Some small areas of Pleasant View soils are used for dryfarmed wheat. The vegetation consists dominantly of brushy Gambel oak, bitterbrush, western wheatgrass, Indian ricegrass, sand dropseed, and Kentucky bluegrass. These soils are suitable for watersheds and for limited use for grazing. Some areas are suitable for community developments.

Controlling erosion is the most needed management. These soils should be kept in permanent vegetation. Seeding and water control are practical management practices.

CAPABILITY UNIT VIw–1

This capability unit consists of loams, silt loams, and fine sandy loams that are strongly affected by salts and alkali. These soils are somewhat poorly drained and have a water table between a depth of 20 and 40 inches in most places. They are generally nearly level, but the Trenton soil has slopes as steep as 10 percent in places.

Most of the soils in this unit are highly calcareous. Permeability of the subsoil ranges from moderate to very slow. The hazard of erosion is slight to moderate on most of these soils, but the Trenton soil is severely eroded. The Croy and Terminal soils have a cemented hardpan at a depth of 20 to 36 inches.

Nearly all the acreage of this unit is used for grazing. The vegetation is dominantly saltgrass, foxtail barley, alkali sacaton, greasewood, Nuttall saltbush, cheatgrass brome, and annual weeds. Small areas of Leland soil are used for improved pasture, grass-legume hay, and an occasional crop of a small grain, but yields are very low. The soils in this unit are suited to grazing or to industrial developments.

The main concerns of management are draining these soils and lowering the water table and then reclaiming them from damage by salt and alkali. Draining is difficult because these soils are generally low and outlets are few. Reclamation is not practical because of the high concentration of salt and alkali and the lack of water for leaching. Water is also needed for irrigation after drainage. These soils can be made more productive by seeding grasses that tolerate salt and alkali.

CAPABILITY UNIT VIs–1

This capability unit consists of soils that are not suitable for cultivation, because they are extremely sandy, gravelly, cobbly, or stony. Also they are duned in places. These well-drained to excessively drained soils occur on high lake terraces and colluvial fans. Slopes range from 5 to 30 percent. Many of these soils are gravelly, cobbly, or stony throughout their profile.

The surface layer is dominantly medium textured to coarse textured. Permeability of the subsoil is moderate to very rapid. These soils hold about 0.5 to 1 inch of available water per foot of soil, or about 2.5 to 6 inches to a depth of 5 feet. The soils that have slopes of 10 percent or more are moderately to highly susceptible to erosion. Runoff ranges from slow to rapid.

Nearly all the acreage in this unit is used for watersheds or for grazing. The vegetation dominantly is brushy Gambel oak, big sagebrush, bluebunch wheatgrass, sand dropseed, three-awn, and Indian ricegrass.

Most of these soils are not suited to cultivated crops, because they are too gravelly, cobbly, or stony or have sand dunes on the surface. Some small areas are suitable for orchards, and they can be cultivated if kept under permanent cover and carefully managed. These soils are suited to watersheds and grazing. They should be kept in permanent vegetation. Seeding and controlling water are practical.

CAPABILITY UNIT VIIe-1

This capability unit consists of deep, well-drained, steep to very steep, eroded soils. These soils are on high lake terraces and terrace escarpments. Slopes range from 30 to 60 percent.

These soils are friable. Organic matter makes up about 2 to 5 percent of the surface layer in the Timpanogos and Parleys soils and 1 to 3 percent in the Hillfield soils. Permeability of the subsoil is moderate to moderately slow. The hazard of erosion is high.

All the acreage in this unit is used as watersheds and for grazing. These soils are not suited to cultivation, because they are too steep and the hazard of erosion is too high. The vegetation is dominantly brushy Gambel oak, western wheatgrass, bitterbrush, Indian ricegrass, needle-and-thread, sand dropseed, and Kentucky bluegrass.

Management is needed mainly for controlling erosion. These soils should be kept in permanent vegetation. Seeding is not practical, because the slopes are too steep.

CAPABILITY UNIT VIIw-1

This capability unit consists of nearly level soils that are strongly affected by salts and alkali. These soils are somewhat poorly drained to poorly drained and have a water table that is within 20 inches of the surface most of the time. They occur on low lake terraces, low flood plains, and lake plains and are flooded during wet periods.

Texture of the surface layer ranges from fine to moderately coarse. Permeability ranges from moderate to very slow. The hazard of erosion is none to slight.

Most of the acreage in this unit is used for grazing or as a wildlife refuge. The vegetation is dominantly saltgrass, alkali sacaton, pickleweed, foxtail barley, cheatgrass brome, and povertyweed, but the vegetation on Abbott clay is sparse. The soils in this unit are suitable for grazing, but they should be kept under permanent cover.

CAPABILITY UNIT VIIs-1

This capability unit consists dominantly of loams, loamy fine sands, and sandy loams. Except for the loamy fine sand, all are gravelly, stony, or rocky. These well-drained to somewhat excessively drained soils are on high terraces, fans, or steep faces of mountains. Slopes range from 6 to 70 percent, and many of the soils are moderately eroded. The hazard of erosion is moderate to high, depending on the kind and amount of vegetation.

Most of the acreage in this unit is used as watersheds and for grazing, but some areas are used for community developments. Grazing is prohibited on much of the area. The native vegetation is dominantly brushy Gambel oak, big sagebrush, western wheatgrass, Indian ricegrass, needle-and-thread, and sand dropseed.

CAPABILITY UNIT VIIIw-1

This capability unit consists of soils that have no value for farming, because they are flooded at times during the year and are strongly affected by salts and alkali. These soils are on nearly level lake plains and flood plains. Except for scattered areas of saltgrass, pickleweed, and tules, they are barren.

CAPABILITY UNIT VIIIs-1

Only Rock outcrop, a miscellaneous land type, is in this capability unit. This land type is mainly in the northeastern part of the survey area north of Ogden. It is nearly barren, but a few trees and shrubs grow from crevices in the rocks. This land has no value for farming but may have some use as wildlife habitat or watersheds.

Estimated Yields

Table 3 gives the estimated average acre yields of the principal crops and pasture grown on irrigated soils under two levels of management. These yields are estimated on the basis of records obtained from farmers for specific soils, on field observations of soil scientists, and on data obtained from the Utah Agricultural Experiment Station. If no information was available for a particular soil, the estimates were made on the basis of yields on a similar soil. Only soils that are suitable for the crops and pasture specified are listed in table 3. Soils not listed are steep, stony, rocky, or extremely wet, or they contain large amounts of salts and alkali. Miscellaneous land types also are not listed in table 3. Although soil complexes are not listed, yields of a complex can be determined by referring to the soils in the complex.

The yields in columns A are those that can be expected under average or common management. Under common management, little or no fertilizer is added, barnyard manure is not added regularly, or plants are not adequately irrigated for optimum growth.

The yields in columns B are those expected over a period of years under a moderately high level of management. This management provides the addition of 80 to 100 pounds of nitrogen per acre each year on corn, sugarbeets, pasture, potatoes, and orchards and 200 pounds of phosphate every 2 to 4 years on alfalfa and other legumes. In addition sugarbeets, tomatoes, and some other row crops receive 80 to 100 pounds of phosphate per acre. Most farmers obtaining yields similar to those in table 3 also use barnyard manure regularly in addition to fertilizer for crops other than alfalfa. For this high level of management, irrigation water is applied as needed for the optimum growth of plants.

Yields considerably higher than those listed in table 3 are common in a single year. The yields listed are averages over a long period. To obtain highest yields, the farmer needs to apply large amounts of fertilizer, add all available barnyard manure, irrigate crops adequately, use a good cropping sequence, and practice other good management.

TABLE 3.—*Estimated average acre yields of principal*

[Yields in columns A are expected under common management; yields in columns B are expected under a

Soil	Alfalfa		Corn (silage)		Corn (grain)	
	A	B	A	B	A	B
	Tons	*Tons*	*Tons*	*Tons*	*Bu.*	*Bu.*
Ackmen loam, 1 to 3 percent slopes	4.5	6.0	17	22	100	140
Ackmen loam, 3 to 6 percent slopes	3.5	5.5				
Ackmen loam, 6 to 10 percent slopes	3.0	5.0				
Ackmen loam, 10 to 20 percent slopes, eroded						
Airport silt loam	2.5	3.5	13	18		
Airport silty clay loam	2.0	3.0	10	15		
Chance loam, 0 to 3 percent slopes	3.0	4.5	13	20		
Cudahy silt loam, 0 to 3 percent slopes	2.5	4.5	14	18		
Draper loam, 0 to 1 percent slopes	3.0	4.0	16	22	95	130
Draper loam, 1 to 3 percent slopes	3.0	4.0	14	20	95	125
Draper loam, drained, 0 to 1 percent slopes	3.5	5.0	19	25	100	140
Draper loam, drained, 1 to 3 percent slopes	3.5	5.0	14	20	95	125
Draper loam, drained, 3 to 6 percent slopes	3.0	4.5				
Draper gravelly loam, gravelly subsoil variant, 1 to 3 percent slopes	3.0	4.0	14	20	85	115
Draper gravelly loam, gravelly subsoil variant, 3 to 6 percent slopes	3.0	4.0				
Ford loam	2.0	3.0	10	15		
Ford loam, shallow water table	2.0	3.0	10	15		
Francis loamy fine sand, 0 to 3 percent slopes	3.5	4.5	13	18	80	120
Francis loamy fine sand, 3 to 6 percent slopes	2.5	3.5				
Francis loamy fine sand, 6 to 10 percent slopes	2.0	3.0				
Francis loamy fine sand, 10 to 20 percent slopes, eroded						
Gooch silt loam	2.5	3.5	13	18		
Harrisville silt loam, 0 to 1 percent slopes	3.0	4.5	15	20		
Harrisville silt loam, 1 to 3 percent slopes	3.0	4.5	15	20		
Harrisville silt loam, 3 to 6 percent slopes	3.0	4.0				
Hillfield soils, 6 to 10 percent slopes, eroded	2.5	4.0				
Hillfield soils, 10 to 20 percent slopes, eroded						
Ironton silt loam, 0 to 1 percent slopes	3.5	5.0	19	25	100	140
Ironton silt loam, 1 to 3 percent slopes	4.0	5.0	17	25	100	140
Ironton silt loam, 3 to 6 percent slopes	3.0	4.5				
Ironton silt loam, moderately alkali, 0 to 1 percent slopes	3.0	4.5	15	20		
Kidman fine sandy loam, 0 to 1 percent slopes	4.5	6.0	19	24	115	150
Kidman fine sandy loam, 1 to 3 percent slopes	4.0	5.5	17	22	110	145
Kidman fine sandy loam, 3 to 6 percent slopes	3.5	5.0				
Kidman fine sandy loam, 6 to 10 percent slopes	3.5	5.0				
Kidman fine sandy loam, 10 to 20 percent slopes, eroded						
Kilburn sandy loam, 0 to 1 percent slopes	3.0	4.5	13	18	85	125
Kilburn sandy loam, 1 to 3 percent slopes	3.0	4.5	13	18	80	125
Kilburn sandy loam, 3 to 6 percent slopes	2.5	3.5				
Kilburn gravelly sandy loam, 1 to 3 percent slopes	3.0	4.0	13	18	80	120
Kilburn gravelly sandy loam, 3 to 6 percent slopes	2.5	3.5				
Kilburn gravelly sandy loam, 6 to 10 percent slopes	2.0	3.0				
Kilburn gravelly sandy loam, 10 to 20 percent slopes, eroded						
Kilburn cobbly sandy loam, 3 to 10 percent slopes	2.0	3.0				
Kilburn gravelly sandy loam, deep over clean sands, 0 to 3 percent slopes	1.5	3.0				
Kilburn gravelly sandy loam, deep over clean sands, 3 to 10 percent slopes	1.5	3.0				
Kirkham loam	3.5	5.0	19	25	110	140
Kirkham silty clay loam	3.5	4.5	15	20	100	140
Kirkham silty clay loam, strongly alkali	2.0	3.0	10	14		
Layton loamy fine sand, 0 to 3 percent slopes	4.0	5.5	15	20	100	140
Layton loamy fine sand, 3 to 6 percent slopes	2.5	3.5				
Layton loamy fine sand, 6 to 10 percent slopes	2.0	3.0				
Layton loamy fine sand, duned, 1 to 3 percent slopes	3.0	4.0	12	18	75	115
Logan silty clay loam	3.0	4.5	13	20		
Logan silty clay loam, moderately alkali			10	18		
Logan silty clay loam, shallow water table			13	20		
Marriott gravelly sandy loam, calcareous variant, 6 to 10 percent slopes	2.0	3.0				
Marriott gravelly sandy loam, calcareous variant, 10 to 20 percent slopes, eroded						
Martini fine sandy loam, 0 to 1 percent slopes	3.5	4.5	14	20	85	120
Martini fine sandy loam, 0 to 1 percent slopes, channeled	3.5	4.5	14	20	85	120
Parleys loam, 0 to 1 percent slopes	4.5	6.0	20	25	120	150
Parleys loam, 1 to 3 percent slopes	4.5	6.0	17	22	115	150
Parleys loam, 3 to 6 percent slopes	3.5	5.5				
Parleys loam, 6 to 10 percent slopes	3.0	5.0				
Parleys loam, 10 to 20 percent slopes, eroded						
Pleasant View loam, 1 to 3 percent slopes	4.0	5.5	15	20	100	130

See footnote at end of table.

crops, fruits, and pasture on irrigated soils

moderately high level of management. Absence of yield indicates crop is seldom grown on the soil specified]

Wheat		Barley		Sugarbeets		Tomatoes		Potatoes		Peaches		Apricots		Cherries		Pasture	
A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Cwt.*	*Cwt.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
50	75	65	85	17	22	16	22	235	300	230	300	260	350	4.5	6.0	265	350
45	70	55	80							200	300	225	325	4.0	5.5	225	325
40	65	50	75							140	250	200	300	3.5	5.0	180	275
										125	200	180	250	2.5	4.0	100	175
		45	65	10	15											200	275
		40	60	8	12											180	250
50	70	55	90	15	20											225	300
35	50	45	65	14	18											200	275
45	65	55	70	14	20	14	20									230	300
40	60	60	80	13	18	12	18									230	300
50	70	60	80	15	22	16	25									250	325
45	65	60	80	13	18	14	20									230	300
40	60	55	80													190	275
45	60	55	75	14	18	14	20									230	300
40	55	50	75													175	250
35	45	45	60													190	250
35	45	45	60													190	250
35	50	50	70	15	20	15	20	150	200	175	250	200	275	3.0	4.0	200	275
30	45	40	55							170	225	175	250	3.0	4.0	180	250
30	40	35	50							165	225	175	250	3.0	4.0	175	225
										165	225	175	250	3.0	4.0	110	150
		45	65	10	15											200	275
		50	75	13	18											225	300
		50	75	13	18											225	300
		50	75													200	275
40	50	45	70							125	225	140	250	2.5	4.0	180	275
										100	175	150	225	2.5	4.0	90	160
50	70	60	80	15	22	15	22									250	325
45	70	60	80	15	20	14	20									240	325
40	60	55	75													190	275
40	60	50	75	13	18											225	300
45	75	65	85	18	25	18	23	235	300	210	275	210	300			250	325
45	70	65	85	17	22	16	23	235	300	200	275	200	300			240	325
45	70	50	80							175	275	200	300	3.0	4.5	225	325
40	65	45	75							175	250	200	280	3.0	4.5	200	300
40	55	40	70							175	250	200	280			175	275
40	55	55	80	16	24	13	18	150	200	190	250	225	300			200	275
40	55	60	80	16	24			150	200	180	250	200	300			200	275
30	45	40	60							175	250	175	275	3.0	4.0	200	275
35	50	50	70	15	20					200	275	225	300			200	275
30	45	40	60							175	250	175	275	3.0	4.0	180	250
30	40	40	50							165	225	175	250	3.0	4.0	175	250
										165	225	175	250	3.0	4.0	150	200
30	40	35	50							150	225	175	250	3.0	4.0	175	250
30	40	45	60													200	275
30	40	35	50							150	225	175	250	3.0	4.0	175	250
50	70	60	85	15	22	15	22									250	325
45	65	60	85	15	22	14	20									250	325
35	45	40	60	8	12											180	250
50	70	60	90	18	28	15	20	175	250	190	250	200	275			225	300
30	45	40	55							140	200	140	200	2.5	3.5	180	250
30	40	35	50							140	200	140	200	2.5	3.5	175	225
35	50	50	70	15	20					180	250	200	275			200	275
50	70	55	90	12	18											225	300
40	60	40	70	10	15											175	250
45	65	50	75	12	18											200	275
30	40	35	45							140	225	150	225	2.5	3.5	175	225
										165	225	175	250	2.5	3.5	110	150
40	55	50	70	17	22	14	20	180	250							210	275
40	55	50	70	17	22	14	20	180	250							210	275
55	80	75	90	18	27	18	25	235	300	200	275	260	350	4.5	6.0	265	350
50	75	70	85	17	22	16	22	235	300	200	275	260	350	4.5	6.0	265	350
45	70	65	80							200	275	225	325	4.0	5.5	240	325
40	55	50	75							150	250	200	300	3.5	5.0	200	300
										140	200	180	250	2.5	4.0	100	175
45	70	60	80	15	20	14	20	215	275	200	275	250	325	4.0	5.5	240	310

TABLE 3.—*Estimated average acre yields of principal*

Soil	Alfalfa		Corn (silage)		Corn (grain)	
	A	B	A	B	A	B
	Tons	*Tons*	*Tons*	*Tons*	*Bu.*	*Bu.*
Pleasant View loam, 3 to 6 percent slopes	3.0	5.0				
Pleasant View loam, 6 to 10 percent slopes	3.0	4.5				
Pleasant View loam, 10 to 20 percent slopes						
Pleasant View gravelly sandy loam, 3 to 6 percent slopes	3.0	4.0				
Pleasant View gravelly sandy loam, 6 to 10 percent slopes	2.5	3.5				
Preston fine sand, 1 to 10 percent slopes	2.5	3.5				
Refuge loam	2.0	3.0	10	15		
Roshe Springs silt loam	3.0	4.5	13	20		
Roshe Springs silt loam, deep over clay			13	20		
Roshe Springs silt loam, shallow water table			13	20		
Steed fine sandy loam, 0 to 1 percent slopes	3.0	4.5	13	18	85	125
Steed fine sandy loam, 0 to 1 percent slopes, channeled	3.0	4.5	13	18		
Steed gravelly fine sandy loam, 0 to 2 percent slopes	1.5	3.0				
Steed gravelly fine sandy loam, 0 to 2 percent slopes, channeled	1.5	3.0				
Sterling gravelly loam, 6 to 10 percent slopes	2.0	3.0				
Sterling cobbly loam, 8 to 20 percent slopes						
Sunset loam, 0 to 1 percent slopes	3.5	5.0	19	25	100	140
Sunset loam, 1 to 3 percent slopes	3.5	4.5	14	20	95	125
Sunset loam, strongly alkali, 0 to 1 percent slopes	2.5	4.0	13	20		
Sunset loam, gravelly substratum, 0 to 1 percent slopes	4.0	5.0	14	22	90	140
Syracuse loamy fine sand	4.0	5.0	14	20	100	140
Syracuse loamy fine sand, strongly alkali	3.0	4.0	13	18		
Timpanogos loam, 0 to 1 percent slopes	4.5	6.0	19	25	115	150
Timpanogos loam, 1 to 3 percent slopes	4.5	6.0	17	22	110	150
Timpanogos loam, 3 to 6 percent slopes	3.5	5.5				
Timpanogos loam, 6 to 10 percent slopes, eroded	3.0	5.0				
Timpanogos loam, 10 to 20 percent slopes, eroded						
Timpanogos very fine sandy loam, noncalcareous variant, 6 to 10 percent slopes	3.0	5.0				
Timpanogos very fine sandy loam, noncalcareous variant, 10 to 20 percent slopes						
Trenton silt loam, 1 to 3 percent slopes, eroded	2.0	3.0				
Warm Springs fine sandy loam, 0 to 1 percent slopes	3.5	5.0	19	25	100	150
Warm Springs fine sandy loam, 1 to 3 percent slopes	3.5	4.5	14	20	95	140
Warm Springs fine sandy loam, deep over clay, 0 to 1 percent slopes	2.0	3.5	12	18		
Warm Springs fine sandy loam, strongly alkali, 0 to 1 percent slopes	2.5	4.0	13	20		
Warm Springs fine sandy loam, shallow water table, 0 to 1 percent slopes			14	20		
Woods Cross silty clay loam	3.0	4.5	13	20		
Woods Cross silty clay loam, drained	3.0	4.5	13	20		

[1] Cow-acre-days is a term used to express the carrying capacity of pasture. It is the number of animal units carried per acre multiplied by the number of days the pasture is grazed during a single grazing season without injury to the sod. An acre of pasture that provides 30 days of grazing for two cows has a carrying capacity of 60 cow-acre-days.

The yields listed in table 3 for soils that are somewhat poorly drained, poorly drained, and very poorly drained, and for soils affected by salts and alkali, are the yields that can be expected after the soils have been drained and reclaimed from damage.

Some soils in the Davis-Weber Area are used for dryfarmed wheat. Table 4 gives the estimated yields of wheat for these soils under common management and under a moderately high level of management.

TABLE 4.—*Estimated average acre yields of dryfarmed wheat under two levels of management*

Soil	Common management	Moderately high level of management
	Bu.	*Bu.*
Ackmen loam, 6 to 10 percent slopes	18	25
Ackmen loam, 10 to 20 percent slopes, eroded	15	22
Hillfield soils, 6 to 10 percent slopes, eroded	15	20
Hillfield soils, 10 to 20 percent slopes, eroded	14	20
Kidman fine sandy loam, 3 to 6 percent slopes	18	25
Kidman fine sandy loam, 6 to 10 percent slopes	18	25
Kidman fine sandy loam, 10 to 20 percent slopes, eroded	18	25
Parleys loam, 6 to 10 percent slopes	18	25
Parleys loam, 10 to 20 percent slopes, eroded	18	25
Timpanogos loam, 6 to 10 percent slopes, eroded	18	25
Timpanogos loam, 10 to 20 percent slopes, eroded	18	25

Use and Management of Soils for Range [5]

Much of the Davis-Weber Area was formerly in range, but more than half of the acreage has since been plowed and converted to use for crops. Now, approximately 90,000 acres, or about 40 percent of the survey area, is in range or pasture. In the areas used for range, the soils are unsuitable for cultivation, because they are steep,

[5] LAMAR R. MASON, range specialist, Soil Conservation Service, helped prepare this subsection.

crops, fruits, and pasture on irrigated soils—Continued

Wheat		Barley		Sugarbeets		Tomatoes		Potatoes		Peaches		Apricots		Cherries		Pasture	
A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Cwt.*	*Cwt.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Cow-acre-days*[1]	*Cow-acre-days*[1]
45	70	50	80							175	275	225	325	3.5	5.0	225	310
40	55	45	70							150	250	180	275	3.0	4.5	210	290
										125	200	175	250	2.5	4.0	100	175
35	50	45	65							180	250	180	275	3.0	4.0	200	275
35	45	40	55							150	225	175	250	3.0	4.0	175	250
30	45	35	55							150	200	150	200	2.5	3.5	150	225
		40	60													180	250
50	70	55	90	15	20											225	300
45	65	50	75	12	18											200	275
45	65	50	75	12	18											200	275
40	55	55	75	15	20	12	18	150	200	190	250	200	275			200	275
40	55	55	75	13	20					175	225	200	275			200	275
30	40	45	70													200	275
30	40	45	70													200	275
35	45	35	50							165	225	175	250	3.0	4.0	150	250
										165	225	175	250	3.0	4.0	110	150
50	70	60	80	15	22	15	22									250	325
45	65	55	75	15	20	14	20									230	300
40	60	45	70	12	18											180	275
45	75	65	85	15	22	14	22	200	275	190	250	200	220	4.0	5.0	225	250
45	65	50	80	14	22	14	22	175	275							225	300
40	60	45	70	13	20											180	275
55	80	75	90	18	25	18	25	235	300	220	275	260	350	4.5	6.0	265	350
50	75	65	85	17	22	16	22	235	300	200	275	260	350	4.5	6.0	265	350
45	70	55	80							180	260	225	325	4.0	5.5	250	325
40	55	50	75							150	250	200	300	3.5	5.0	200	300
										140	200	180	250	2.5	4.0	100	175
40	50	50	75							140	250	200	300	3.5	5.0	180	275
										125	200	175	250	2.5	4.0	100	175
		40	60													180	250
50	70	60	80	15	22	15	22									250	325
45	65	55	75	15	20	14	18									230	325
40	60	45	70	10	15											160	250
40	60	45	70	12	18											180	275
45	65	50	75	12	18											200	275
45	65	50	80	13	18											200	300
50	70	55	90	15	20											225	300

have a high water table, contain salts or alkali, or lack irrigation water. Also, most of the areas used for range or pasture are interspersed with areas of cultivated soils and are small and of irregular shape. Nevertheless, because the acreage of soils unsuitable for cultivation is so large, range has always had high value in the survey area. It is grazed by large numbers of dairy and beef cattle, sheep, and horses. Good management of the range is of great importance.

In many places excessive grazing has brought changes in the kinds of plants growing on the range and has caused the range to deteriorate. Some of the better forage grasses and forbs have been replaced by plants that have little or no value for grazing. Brushy Gambel oak (commonly called oakbrush), sagebrush, cheatgrass brome, and annual weeds are now the dominant plants in some areas that have been excessively grazed.

Range sites and condition classes

In the Davis-Weber Area, the soils used for range vary widely in characteristics. Well-drained to excessively drained soils occur in many places in the eastern part of the survey area. Somewhat poorly drained or poorly drained soils occupy large, low-lying tracts west of the densely populated places. Some of the soils that have restricted drainage are also affected by salts and alkali. Much of the vegetation growing on those soils differs from that growing on soils in the eastern part of the survey area.

To manage his range well, and to use the range to best advantage, the rancher should know the different kinds of soils in his holdings, the location of each kind of soil, and the kinds and amounts of vegetation that can be grown on each. He can then regulate grazing so that the vigor and abundance of the best plants are increased.

The basic unit on which management of the range is determined is the range site. A range site is an area of range uniform enough in climate, soils, drainage, exposure, and topography that it produces a specific kind and amount of vegetation. The kind of vegetation, in most instances, is the combination of plants that grew

on the site before the range was affected by grazing or cultivation and is called the potential vegetation. Generally, the potential vegetation is the most productive combination of range plants that a site can support. The potential vegetation, or plant community, remains on the site if it is not disturbed by fire, excessive grazing, insects, or plant diseases.

If the range is grazed heavily or at the wrong time, the most valuable forage plants on the range, called *decreasers*, become more scarce and eventually disappear. Their place is taken by *increasers*, or less palatable plants that made up only a small part of the original vegetation. These increasers, in turn, become less abundant where excessive or untimely grazing is continued, or where fire or insects seriously damage the range. Then, other kinds of plants, called *invaders*, find room to grow. Invaders were not a part of the original vegetation. They are the least desirable of the plants on the range and are practically worthless.

Allowing livestock to graze only about half of each season's growth of the potential vegetation, or key forage species, keeps the range from deteriorating and increases the amount of forage produced annually. Where the slopes are steeper than 30 percent, the amount of grazing should be decreased by about 10 percent for each 10 percent increase in slope above 30 percent. Reseeding of some areas is needed to bring the range up to its potential.

The condition of the range is determined by comparing, in kind and number, the plants of the present vegetation with those of the potential vegetation. It is related to the amount of increasers, decreasers, and invaders on the site. Four classes of range condition have been recognized. A range in *excellent* condition has from 76 to 100 percent of the vegetation characteristic of the potential vegetation, or that on the site originally; one in *good* condition has 51 to 75 percent; one in *fair* condition has 26 to 50 percent; and one in *poor* condition has less than 26 percent.

The scientific names of plants that grow on ranges in the Davis-Weber Area are given along with their common names in the list that follows. Wherever the standardized plant name differs from the name commonly used, the standardized name is given in parentheses.

Grasses and Grasslike Plants

Scientific name	*Common name*
Agropyron inerme	Beardless bluebunch wheatgrass.
A. pauciflorum	Slender wheatgrass.
A. Smithi	Western wheatgrass.
A. spicatum	Bearded bluebunch wheatgrass.
Agrostis alba	Redtop.
Aristida spp	Three-awn (fluffgrass).
Bromus carinatus	Mountain brome.
B. tectorum	Cheatgrass (cheatgrass brome).
Carex spp	Dryland sedge (sedge).
Deschampsia caespitosa	Tufted hairgrass.
Distichlis stricta	Saltgrass (inland saltgrass).
Eleocharis rostellata	Beaked spikesedge.
E. spp	Spikesedge.
Elymus cinereus	Great basin wildrye.
E. glaucus	Blue wildrye.
E. triticoides	Creeping wildrye (beardless wildrye).
Hilaria jamesi	Curleygrass (galleta).

Grasses and Grasslike Plants—Continued

Scientific name	*Common name*
Hordeum jubatum	Foxtail (foxtail barley).
Juncus balticus	Wiregrass (baltic rush).
Koeleria cristata	Prairie junegrass (junegrass).
Oryzopsis hymenoides	Indian ricegrass.
Phleum alpinum	Alpine timothy.
Poa ampla	Big bluegrass.
Poa juncifolia	Alkali bluegrass.
P. pratensis	Kentucky bluegrass (bluegrass).
P. secunda	Sandberg bluegrass.
Puccinellia distans	Weeping alkaligrass.
Sitanion hystrix	Squirreltail.
Spartina gracilis	Alkali cordgrass.
Sporobolus airoides	Alkali sacaton.
S. cryptandrus	Sand dropseed.
Stipa columbiana	Columbia needlegrass.
S. comata	Needle-and-thread.
S. lettermani	Letterman needlegrass.

Forbs

Scientific name	*Common name*
Achillea lanulosa	Yarrow (western yarrow).
Allium spp	Onion.
Artemisia discolor	Herbaceous sage (sweet sagebrush).
Astragalus utahensis	Utah loco.
Balsamorhiza macrophylla	Balsamroot (cutleaf).
Calochortus spp	Sego Lily (mariposa).
Castilleja coccinea	Indian paintbrush.
Cirsium lanceolatum	Bullthistle.
Crepis spp	Hawksbeard.
Dodecatheon spp	Shootingstar.
Eriogonum spp	Buckwheat (eriogonum).
E. ovalifolium	Cushion eriogonum.
Eriogonum umbellatum	Sulfur eriogonum.
Geranium richardsoni	Geranium (Richardson geranium).
Glycyrrhiza lepidota	American licorice (licoriceroot).
Grindelia squarrosa	Curlycup gumweed (gumweed).
Helianthella uniflora	Little sunflower.
Heracleum lanatum	Common cowparsnip (wild parsnip).
Iva axillaris	Povertyweed.
Lathyrus spp	Peavine.
Lupinus spp	Lupine.
Mentha spp	Mint.
Penstemon spp	Penstemon.
Potentilla anserina	Silverweed cinquefoil.
Tragopogon spp	Oysterplant (salsify).
Trifolium spp	Clover.
Triglochin maritima	Arrowweed (shore podgrass).
Viguiera multiflora	Showy goldeneye.
Zigadenus spp	Deathcamas.

Shrubs and Trees

Scientific name	*Common name*
Acer negundo	Boxelder.
Amelanchier alnifolia	Serviceberry.
Artemisia tridentata	Big sagebrush.
Atriplex nuttalli	Nuttall saltbush.
Cercocarpus betuloides	Birchleaf mountainmahogany.
Chrysothamnus lanceolatus	Yellowbrush.
C. nauseosus	Big rabbitbrush.
Crataegus rivularis	Hawthorn (river hawthorn).
Eriogonum spp	Buckwheat (eriogonum).
Gutierrezia sarothrae	Broom snakeweed (snakeweed).
Lycium andersoni	Squawbush (Anderson wolfberry).
Mahonia repens	Oregongrape.
Populus angustifolia	Narrowleaf cottonwood.
Prunus virginiana	Chokecherry.
Purshia tridentata	Bitterbrush (antelope bitterbrush).
Quercus gambeli	Oakbrush (Gambel oak).
Rosa spp	Rose bush.
Salix exigua	Coyote willow.
Sarcobatus vermiculatus	Greasewood (black greasewood).
Symphoricarpos	Snowberry (longflower snowberry)
Tetradymia canescens	Spineless gray horsebrush.

Climatic zones and their effect on range

Plants growing on the range in different parts of the survey area are affected not only by differences in the kinds of soils but also by differences in climate. Three distinct climatic zones are recognized in the survey area. These zones are determined on the basis of differences in the amount of moisture received and on differences in the average annual temperatures and the length of the growing season. They are the Mountain climatic zone, on the slopes of the Wasatch Mountains; the Upland climatic zone, in the eastern, northeastern, and central parts of the survey area; and the Wet and Semiwet climatic zone in the western part.

The average amount of moisture received annually from precipitation in the Mountain climatic zone is 18 to 22 inches. In each of the two other zones, only about 15 to 20 inches is received. Additional moisture, however, is received from runoff or from subirrigation or the water table in the Wet and Semiwet climatic zone. The length of the growing period varies in the different zones. In all three zones, however, summers are warm and dry and winters are cold and snowy. In June, July, August, and September—the driest months—the amount of moisture lost through evapotranspiration exceeds that received from rainfall; plants must depend for their moisture, mainly on water stored in the soils during winter. More detailed information about temperatures and precipitation in the survey area can be found in the section "Climate" near the front of this soil survey.

Mountain Climatic Zone.—In this climatic zone, the growing period for plants begins about March 15 to April 1. Most growth takes place during May and June. Growth of most plants ends about June 15 to July 1. But some plants, especially grasses, again become green and grow better when the amount of rainfall increases and the weather becomes cooler late in summer and early in fall. Shrubs also grow better when the weather is cooler and less dry, and they continue growing until the first killing frost.

The frost-free period in this zone is about 150 days, and the average annual temperature is about 49° F. Only one range site, Mountain Stony Loam, is in this climatic zone.

Upland Climatic Zone.—In this climatic zone, as in the Mountain zone, the growing period for plants begins about March 15 to April 1. Most growth takes place during May and June, and growth of most plants ends about June 15 to July 1. Grasses again become green and begin to grow, when the amount of rainfall increases and the weather becomes cooler late in summer and early in fall. Shrubs also grow better when the weather is cooler and more moist, and they continue growing until the first killing frost.

The frost-free period in this climatic zone is about 157 days, or from about May 2 to October 6. The average annual temperature is about 50.5° F. The Upland Loam, Upland Stony Loam, Upland Gravelly Loam, and Upland Sand range sites are in this climatic zone.

Wet and Semiwet Climatic Zone.—In this climatic zone, extra moisture is received from runoff from adjacent soils, or from subirrigation or a high water table. In summer and fall, however, the soils are generally dry at the surface because the water table is low.

In this zone the growing period for plants begins about April 1 to April 15. It continues to about August 15 for plants growing on the Wet Meadow and Semiwet Meadow range sites, and until the first killing frost, or about October 1 to October 10, for the Salt Meadow and Alkali Bottom range sites. Plants make most of their growth during the period May 1 to July 15.

The average frost-free period in this zone is about 175 days. The Wet Meadow, Semiwet Meadow, Salt Meadow, and Alkali Bottom range sites are in this climatic zone.

Descriptions of the range sites

To help ranchers in the survey area evaluate their range, all of the soils that are still in range have been grouped in range sites. Nine different range sites are recognized in the survey area. They are described alphabetically in the following pages, and the climatic zone is given for each site. The names of the soils in each range site can be found by turning to the "Guide to Mapping Units" in the back of this soil survey.

ALKALI BOTTOM RANGE SITE

This range site is on broad, low lake terraces, lake plains, and flood plains along the western side of the survey area (fig. 6). It is in the Wet and Semiwet climatic zone. The slopes are mainly between 0 and 3 percent but are as steep as 10 percent in places. The elevations range from about 4,210 to 4,500 feet.

The soils of this range site are somewhat poorly drained and are moderately to strongly affected by salts and alkali. In most places the water table is at a depth of 20 to 40 inches. The surface layer ranges from loamy fine sand to clay loam or silty clay loam. The subsoil and the underlying material range from loamy fine sand to silty clay. The Croy, Ford, and Terminal soils of this range site contain a cemented pan.

These soils absorb moisture fairly rapidly in some places and somewhat slowly in others. Runoff is slow, and the hazard of erosion ranges from none to slight. The Trenton soils in this range site are highly susceptible to further erosion because they already contain gullies.

The present vegetation is mainly saltgrass, alkali sacaton, scattered greasewood, and foxtail barley. About 85 percent of the potential vegetation is perennial grasses that tolerate salts, alkali, and excess water; 1 to 2 percent is weeds; and 10 to 15 percent is shrubs.

The important decreaser grasses are alkali bluegrass, alkali sacaton, tufted hairgrass, and alkali cordgrass. Sedges are important increasers. Important increaser grasses are saltgrass, wiregrass, and foxtail barley. Weeds are oysterplant and onion. Shrubs are greasewood and Nuttall saltbush. Common invaders are annual weeds, cheatgrass brome, and povertyweed.

On this site the potential annual yield of air-dry herbage ranges from about 2,700 pounds per acre in favorable years to 2,000 pounds in less favorable years. The amount of forage provided by the herbage ranges from about 1,200 pounds per acre in favorable years to 900 pounds in less favorable years.

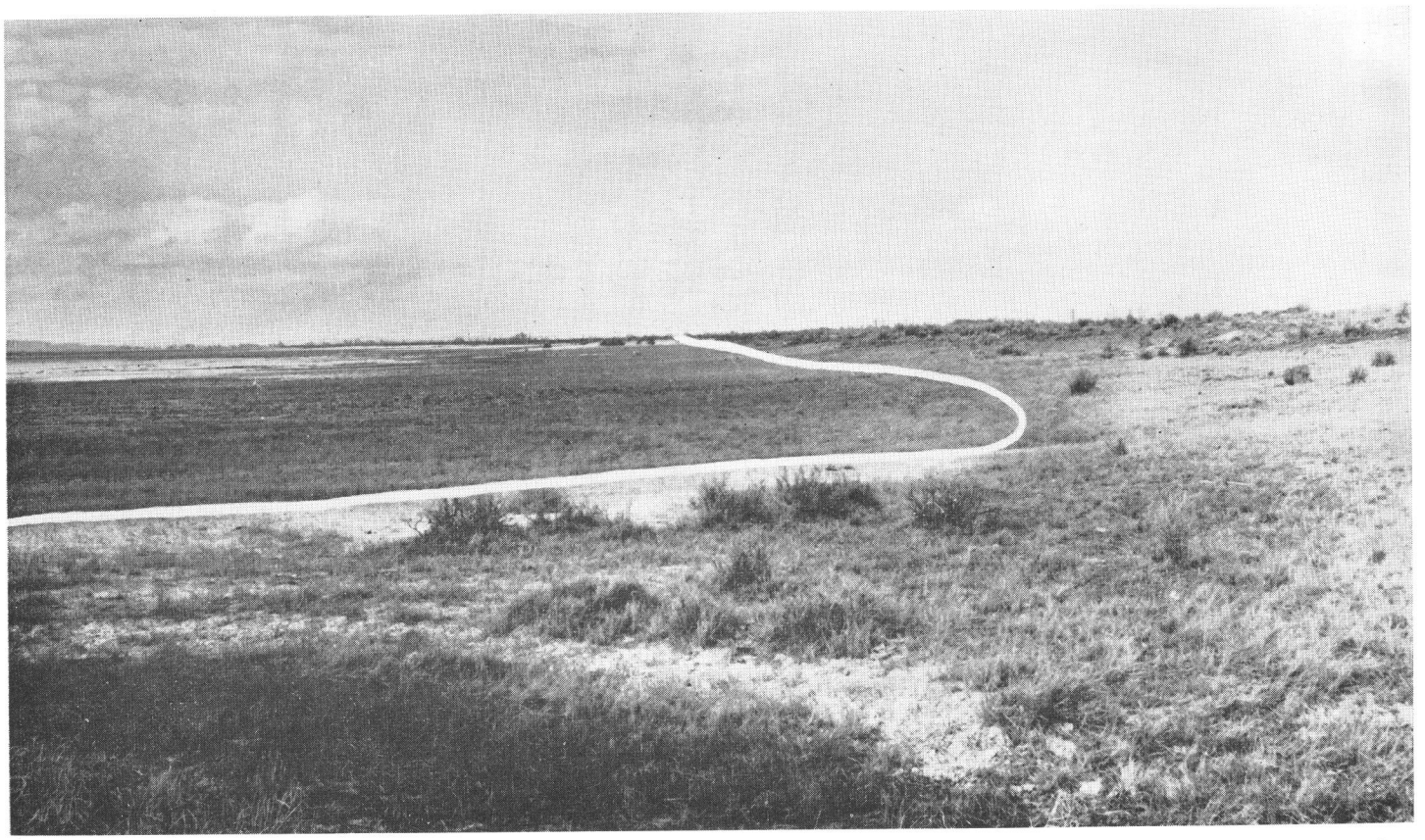

Figure 6.—Range in the western part of the survey area. The part above and to the left of the white line is in Salt Meadow range site; the part below and to the right of the white line is in Alkali Bottom range site.

MOUNTAIN STONY LOAM RANGE SITE

This range site consists of steep or very steep tracts along the eastern edge of the survey area. It is on the slopes of the Wasatch Mountains, in the Mountain climatic zone, above the highest level reached by the waters of ancient Lake Bonneville. Elevations range from about 5,100 to 5,600 feet.

Only one soil, Ridd rocky sandy loam, 30 to 70 percent slopes, eroded, is in this range site. This soil is moderately deep or deep and is well drained. Its surface layer contains cobbles and stones, which increase in number with increasing depth. Bedrock is at a depth of 25 to 40 inches.

This soil absorbs moisture fairly well. In the uppermost 2 feet, it stores about 1.5 inches of available moisture per foot of soil. Below that depth, it holds about 0.5 to 0.7 inch per foot. Therefore, to a depth of 5 feet, about 4 to 5 inches of water is stored for use of plants. All of this moisture has generally been used by July 1. Runoff is medium to rapid, depending on the slopes, the kind of vegetation, and the soil tilth. Erosion is a serious hazard.

The estimated density of the cover of forage plants on this site is about 40 to 45 percent. The present cover of plants consists chiefly of brushy Gambel oak, big sagebrush, bluebunch wheatgrass, and lupine. About 65 percent of the potential vegetation is perennial grasses, 15 percent is weeds, and 20 percent is shrubs.

The most important decreaser grasses are slender wheatgrass, bluebunch wheatgrass, mountain bromegrass, tall native bluegrass, and blue wildrye. Important increaser grasses are Letterman needlegrass, Columbia needlegrass, western wheatgrass, and Great Basin wildrye. Dryland sedges are also important increasers. Increaser forbs are peavine, little sunflower, multiflora geranium, and lupine. Important increaser shrubs are big sagebrush, brushy Gambel oak, snowberry, serviceberry, chokeberry, birchleaf mountainmahogany, and bitterbrush. Common invaders are big rabbitbrush, cheatgrass brome, broom snakeweed, horsebrush, and annual weeds.

The range is generally ready for use between May 1 and May 15. The best seasons for grazing are late in spring, summer, and early in fall, depending on the condition of the range (fig. 7). If grazing is excessive, brushy Gambel oak and other shrubs rapidly increase.

This range site is used mainly as a watershed, and grazing is generally prohibited. The potential annual yield of air-dry herbage per acre, however, ranges from about 2,000 pounds in favorable years to 1,400 pounds in less favorable years. The amount of forage provided by this herbage ranges from about 800 pounds per acre in favorable years to 500 pounds in less favorable years.

SALT MEADOW RANGE SITE

This range site is on broad, low lake terraces and flood plains in the western part of the survey area. It is in

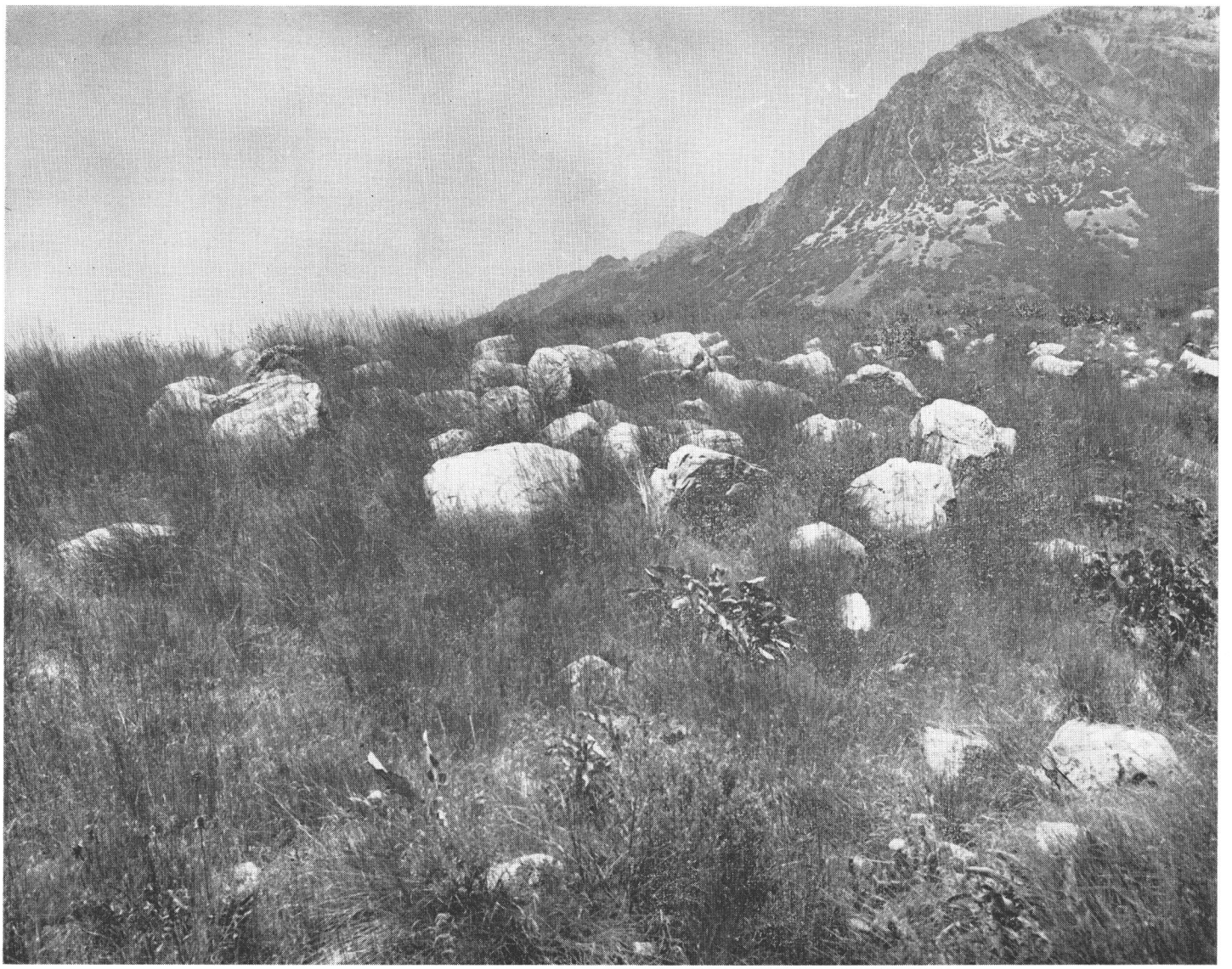

Figure 7.—**Small area of the Mountain Stony Loam range site in good condition. This area is adjacent to an area used for irrigated crops. The soil is Ridd rocky sandy loam, 30 to 70 percent slopes, eroded.**

the Wet and Semiwet climatic zone. The slopes are mostly less than 1 percent. The elevations range from about 4,215 to 4,300 feet.

Most of the soils of this range site are deep and poorly drained, and most of them are moderately or strongly affected by salts and alkali. The water table is generally within 20 inches of the surface. The surface layer is dominantly silt loam or silty clay loam, but the texture ranges from loam to clay. The subsoil and the substratum range from silt loam to clay. The Ford soil of this site contains a pan that is cemented with lime.

The soils of this range site absorb moisture rather slowly. Runoff is slow to ponded. The hazard of erosion is slight in some places, but there is no hazard of erosion in others.

The present vegetation on this site is mainly sedges, wiregrass, saltgrass, alkaligrass, and foxtail barley. The potential cover of vegetation that the site will support is about 95 percent grasses, sedges, and rushes that tolerate salt.

The most important decreaser grasses are alkali bluegrass, creeping wildrye, tufted hairgrass, and alkali sacaton. Important increaser grasses are saltgrass, foxtail barley, wiregrass, alkaligrass, and Kentucky bluegrass. Sedges and rushes are other important increasers. No forbs or shrubs, or only a limited number, are in the potential vegetation.

The potential annual yield of air-dry herbage per acre, where the areas have not been irrigated or fenced for rotation grazing, ranges from about 3,400 pounds in favorable years to 2,500 pounds in less favorable years. The amount of forage provided by this herbage ranges from about 1,500 pounds per acre in favorable years to

1,000 pounds in less favorable years. If the areas are fenced for rotation grazing and are irrigated, a large amount of forage can be produced.

SEMIWET MEADOW RANGE SITE

This range site is on low lake terraces, alluvial fans, and flood plains in the Wet and Semiwet climatic zone. It is mainly in two general areas. One is west and northwest of Ogden in Weber County, and the other is west of Kaysville, Farmington, and Centerville in Davis County. The slopes are mainly between 0 and 3 percent. Elevations range from about 4,220 to 4,700 feet.

The soils of this range site are moderately well drained or somewhat poorly drained. Most of them have a loam or silty loam surface layer, but the surface layer of the Martini soil is fine sandy loam, and that of the Kirkham soil is silty clay loam. The subsoil and the substratum in the soils of this site range from fine sandy loam to silty clay loam. The gravelly subsoil variants of the Draper series contain some gravel throughout the profile.

The soils of this site absorb moisture well. They hold about 1.5 to 2 inches of available moisture per foot of soil, or about 7.5 to 10 inches to a depth of 5 feet. In most places the water table is at a depth between 30 and 48 inches. Some areas are slightly to moderately affected by salts and alkali. Runoff is slow, and the hazard of erosion ranges from none to moderate.

The present vegetation on this site is dominantly Kentucky bluegrass, saltgrass, cheatgrass brome, alkaligrass, and rose bushes. The Martini soil has a cover of cottonwood and boxelder trees in some places. The potential cover of vegetation that the site will support is about 85 percent perennial grasses and 15 percent weeds.

Important decreaser grasses are alkali bluegrass, Great Basin wildrye, tufted hairgrass, and alpine timothy. The most important increaser grasses are western wheatgrass, Kentucky bluegrass, alkaligrass, and wiregrass. Other important increasers are sedges and rushes. Forbs are deathcamas, sego lily, cinquefoil, yarrow, bullthistle, and peavine. The important shrubs are willow and rose.

On this site the potential annual yield of air-dry herbage per acre ranges from about 3,000 pounds in favorable years to 2,500 pounds in less favorable years. The amount of forage provided by this herbage ranges from about 1,500 pounds per acre in favorable years to 1,250 pounds in less favorable years.

UPLAND GRAVELLY LOAM RANGE SITE

This range site is on upland alluvial fans near the base of the Wasatch Mountains in the Upland climatic zone. It is also on old stream terraces and flood plains of the Weber River. The slopes generally face west or southwest and range from 0 to 60 percent. The elevations range from about 4,400 to 5,300 feet.

The soils of this range site are well drained or somewhat excessively drained. In many places the surface layer is gravelly sandy loam, but some of the soils have a surface layer of cobbly sandy loam or stony sandy loam. The soils have a subsoil of gravelly and cobbly sandy loam and a substratum of very gravelly or very cobbly sandy loam or fine sand. The substratum is at a depth of 20 to 24 inches.

These soils absorb moisture well. In the uppermost 30 to 36 inches, about 1 inch to 1.2 inches of available moisture is held per foot of soil, but the soils hold only about 0.5 inch per foot below that depth. To a depth of 5 feet, they hold about 3 to 4.5 inches. All of this moisture is generally used by about June 25. Runoff varies greatly. It ranges from slow to rapid, depending on the slope and on the kind and density of the vegetation. The hazard of erosion is slight to severe.

On this site the estimated density of the cover of forage plants ranges from about 25 to 30 percent. The present vegetation is mainly sand dropseed, Indian ricegrass, needle-and-thread, big sagebrush, cheatgrass brome, and herbaceous sage. About 80 percent of the potential vegetation is perennial grasses, 10 percent is forbs, and another 10 percent is shrubs.

The most important decreaser grasses on this site are bluebunch wheatgrass, tall native bluegrass, slender wheatgrass, and prairie junegrass. Dryland sedges are important increasers. Important increaser grasses are sand dropseed, needle-and-thread, three-awn, and Sandberg bluegrass. Forbs are herbaceous sage, yarrow, buckwheat, deathcamas, balsamroot, oysterplant, lupine, and loco. The important shrubs are brushy Gambel oak, big sagebrush, squawbush, Oregongrape, and snowberry. Common invaders are snakeweed, cheatgrass brome, annual weeds, and sunflower.

If the range is excessively grazed, western wheatgrass begins to increase. It continues to increase during the early stages of depletion, and cheatgrass brome and annual weeds invade. Later, when the cover of plants is in an advanced stage of depletion, it consists only of big sagebrush, cheatgrass brome, and annual weeds in some places.

On this site the potential annual yield of air-dry herbage per acre ranges from about 1,200 pounds in favorable years to 800 pounds in less favorable years. The amount of forage provided by this herbage ranges from about 500 pounds per acre in favorable years to 300 pounds in less favorable years.

UPLAND LOAM RANGE SITE

This range site is mainly along the eastern side of the survey area. It is in the Upland climatic zone, chiefly on high lake terraces or on terraces that are intermediate in height. It is also on alluvial fans and on terrace escarpments. The slopes range from 6 to 60 percent but are mainly between 6 and 25 percent. Many of them face south or southwest. The elevations range from about 4,000 to 5,100 feet.

The soils of this range site are deep and well drained. They have a surface layer of friable loam, silt loam, fine sandy loam, or very fine sandy loam and a subsoil and a substratum of loam, silty clay loam, or fine sandy loam. Most of these soils are free of gravel and stones to a depth of about 36 inches. In the Pleasant View soils, however, pebbles and cobbles make up 20 to 40 percent of the soil material beneath the surface layer.

These soils absorb moisture readily and retain it well. To a depth of 5 feet, they hold about 7.5 to 10 inches of moisture available for plants, but all of this moisture is generally used by about August 1. Permeability is moderate to slow. Runoff is medium to rapid, depending upon the slope and the kind of vegetation. The hazard of erosion is slight to severe.

The estimated density of the cover of forage plants

on this site ranges from 40 to 50 percent. In the areas used for range, the present cover of plants consists mostly of big sagebrush, brushy Gambel oak (mainly on the slopes that face north), western wheatgrass, Indian ricegrass, three-awn, sand dropseed, and cheatgrass brome. About 70 percent of the potential vegetation is perennial grasses, 15 percent is forbs, and 15 percent is shrubs.

Important decreaser grasses on this range site are bluebunch wheatgrass, Great Basin wildrye, tall native bluegrass, and prairie junegrass. The most important increaser grasses are western wheatgrass, needle-and-thread, and Kentucky bluegrass. Dryland sedges are also important increasers. Forbs are lupine, balsamroot, buckwheat, geranium, yarrow, herbaceous sage, hawksbeard, sego lily, and deathcamas. The most important shrubs are brushy Gambel oak, bitterbrush, Oregongrape, big sagebrush, and hawthorn. Common invaders are cheatgrass brome, curlycup gumweed, American licorice, annual weeds, yellowbrush, and snakeweed.

If the range is excessively grazed, western wheatgrass increases and cheatgrass brome and annual weeds invade. Then, big sagebrush begins to increase rapidly as the better grasses decrease. In some places where the range has seriously deteriorated, the cover of plants consists only of big sagebrush, cheatgrass brome, and annual weeds.

On most of this site, the range is in only fair condition. It is generally ready for grazing by April 15 to May 1.

When this site is in excellent condition, the annual yield of air-dry herbage per acre ranges from about 2,200 pounds in favorable years to 1,500 pounds in less favorable years. The amount of forage provided by this herbage ranges from about 800 pounds per acre in favorable years to about 500 pounds in less favorable years.

UPLAND SAND RANGE SITE

This range site consists mainly of partly stabilized sand dunes and of lakeshore sediments that have been reworked by wind. It is in the Upland climatic zone, mostly on upland terraces in the central part of the survey area, near Hill Air Force Base. The slopes are mainly between 0 and 20 percent, but they are as steep as 50 percent in places. The elevations range from about 4,350 to 5,200 feet.

The soils of this range site are deep. They are moderately well drained to excessively drained fine sands or loamy fine sands.

These soils absorb moisture readily. They hold about 0.5 to 0.9 inch of available moisture per foot of soil, or, to a depth of 5 feet, a total of about 2.5 to 6 or 7 inches. Runoff is slow. Permeability is rapid or very rapid, and the available water capacity is low. The hazard of wind erosion is severe.

On this site the estimated density of the cover of forage plants ranges from about 20 to 25 percent. The potential cover of vegetation is about 80 percent perennial grasses, 10 percent forbs, and 10 percent shrubs. The present vegetation is mainly Indian ricegrass, sand dropseed, cheatgrass brome, and scattered big sagebrush.

The most important decreaser grasses on this site are needle-and-thread, Indian ricegrass, tall native bluegrass, and prairie junegrass. Dryland sedges are important increasers. Increaser grasses are sand dropseed, western wheatgrass, and three-awn. Forbs are oysterplant, penstemon, lupine, sego lily, Indian paintbrush, and herbaceous sage. Important shrubs are big sagebrush, buckwheat, and brushy Gambel oak. Cheatgrass brome, rabbitbrush, annual weeds, and snakeweed are common invaders.

On this site the potential annual yield of air-dry herbage per acre ranges from about 1,000 pounds in favorable years to 600 pounds in less favorable years. The amount of forage provided by this herbage ranges from about 500 pounds per acre in favorable years to 300 pounds in less favorable years.

UPLAND STONY LOAM RANGE SITE

This range site is mainly on colluvial and alluvial fans deposited on remnants of high lake terraces near the base of the Wasatch Mountains. It is in the Upland climatic zone. Most of the areas are in the northeastern part of the survey area, near North Ogden in Weber County. Some areas lie south of Bountiful in Davis County, and near Little Mountain in the western part of Weber County. The slopes range from 5 to 40 percent and generally face south or southwest. Elevations range from about 4,210 to 5,200 feet.

These soils have a high content of stones, cobbles, and pebbles throughout the profile. They are commonly underlain by bedrock of limestone, quartzite, gneiss, schist, granite, or tillite. In most places their surface layer is gravelly loam, stony loam, gravelly fine sandy loam, or stony sandy loam. The subsoil and substratum are very cobbly or very stony loam or sandy loam.

The soils of this range site absorb moisture moderately well. They hold approximately 1.2 inches of available moisture per foot of soil to a depth of about 2 feet, and about 0.5 to 0.75 inch between depths of 3 and 5 feet. To a depth of 5 feet, these soils hold about 3.5 to 5 inches of available moisture.

On this site the estimated density of the stand of forage plants ranges from about 35 to 40 percent. The potential cover of vegetation is about 75 percent perennial grasses, 10 percent forbs, and 15 percent shrubs.

The most important decreaser grasses are bluebunch wheatgrass, tall native bluegrass, slender wheatgrass, and Great Basin wildrye. Important increaser grasses are western wheatgrass, Sandberg bluegrass, squirreltail, and needle-and-thread. Forbs are lupine, herbaceous sage, yarrow, deathcamas, balsamroot, and oysterplant. The important shrubs are buckwheat, bitterbrush, yellowbrush, big sagebrush, snowberry, and horsebrush. Common invaders are snakeweed, cheatgrass brome, big rabbitbrush, three-awn, curlycup gumweed, and annual weeds.

If this range site is overgrazed or improperly used, the better grasses decrease and big sagebrush increases rapidly. Where the range has seriously deteriorated, the cover of plants consists only of big sagebrush, cheatgrass brome, and annual weeds.

On this site the potential annual yield of air-dry herbage per acre ranges from about 1,400 pounds in favorable years to 1,000 pounds in less favorable years. The amount of forage provided by this herbage ranges from about 600 pounds per acre in favorable years to about 350 pounds in less favorable years.

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WET MEADOW RANGE SITE

This range site is on flood plains and in slight depressions on alluvial fans and lake terraces in the Wet and Semiwet climatic zone. It is mainly in two general areas. The most extensive of these is west of Farmington and Woods Cross in Davis County. The other is near North Ogden in Weber County. The slopes are mainly between 0 and 3 percent but are as steep as 6 percent in places. The elevations range from about 4,250 to 4,500 feet.

The soils of this range site are mostly deep and poorly drained. They have a surface layer of black or nearly black silty clay loam, silt loam, or loam high in content of organic matter. The textures of their subsoil and substratum range from silt loam to clay or silty clay. The Cudahy soil contains a cemented pan at a depth of about 30 inches.

The soils of this site absorb moisture rather slowly. They hold about 2.2 inches of available moisture per foot of soil, or about 10 to 11 inches to a depth of 5 feet. The water table is within 20 inches of the surface. Runoff is slow to ponded. There is little or no hazard of erosion.

The present vegetation on this site is dominantly wiregrass, sedges, saltgrass, and Kentucky bluegrass. The potential cover of vegetation that the site will support is about 90 percent water-tolerant sedges, grasses, and rushes, and only 10 percent weeds.

Important decreaser grasses are tufted hairgrass, creeping wildrye, and redtop. The most important increasers are Kentucky bluegrass, sedges, rushes, wiregrass, and saltgrass. Important forbs are bullthistle, arrowweed, mint, shootingstar, clover, and cowparsnip. Willow is the only kind of shrub growing on this site. Common invaders are foxtail barley, curlytop gumweed, cheatgrass brome, and annual weeds.

The potential annual yields of air-dry herbage per acre, where the areas have not been irrigated or fenced for rotation grazing, ranges from about 4,000 pounds in favorable years to 3,500 pounds in less favorable years. The amount of forage provided by this herbage ranges from about 2,000 pounds per acre in favorable years to 1,500 pounds in less favorable years. If the areas are fenced for rotation grazing and are irrigated, a larger amount of forage can be produced.

Use of Soils for Wildlife

All kinds of wildlife require suitable habitat that provides enough food, cover, water, and living space to support their daily activity. If a landowner insures that these elements of wildlife habitat are plentiful, the wildlife population of an area will increase.

In the Davis-Weber Area, the landowner has many opportunities for improving the natural habitat and for attracting pheasants, mourning doves, ducks, geese, mule deer, muskrats, and fish. Many sites suitable for wildlife are in the broad cultivated areas. Among these are large gullies, drainageways, open ditches, ditchbanks, and steep hillsides. Also suitable for certain kinds of wildlife are lakes, sloughs, streams, and other areas of water. On many farms cultivated crops cannot be produced at fence corners, along fence lines, on banks of permanent ditches, and in gullies too large to farm, but these areas can be improved for use by wildlife. On soils used primarily for the production of fruits or field crops, practices can be used that encourage the production of wildlife as a secondary use. Field windbreaks, trees, and live fences can be established on soils that are used extensively for cultivated crops. Among these soils are the Parleys, Timpanogos, Kidman, Ironton, Ackmen, Sunset, Kilburn, and Layton. Also, the production of wildlife can be an alternate use in many areas of the poorly drained Logan, Roshe Springs, Croy, Ford, Airport, Cudahy, Kirkham, and Warm Springs soils and on the steeper parts of the Ridd, Kilburn, Sterling, Timpanogos, Hillfield, Parleys, Preston, and Francis soils.

Wildlife production is a suitable primary land use in large parts of the Davis-Weber Area. Much of the area adjacent to Great Salt Lake is now enclosed as a reserve for birds and furbearing animals and is under both State and Federal management. The soils in this reserve are mainly the Saltair, Arave, Leland, Lakeshore, Wayment, Refuge, Airport, and Warm Springs. These soils are somewhat poorly drained or poorly drained, and all are affected by salts and alkali. They support plants that provide food and cover for wildlife. Regulating the water level on these soils improves the habitat for wildlife and effectively controls mosquitoes as well.

Chinese pheasant is the most important species that stays in the survey area all year. Some of the better areas for hunting pheasant in the State are in Davis and Weber Counties. These birds largely inhabit the irrigated cropland, wetland, and the land adjacent to these areas. Mourning doves are migratory. They come into the area in spring for nesting, and they leave late in summer or in fall after they raise their young. Mourning doves are attracted to grainfields, but many remain in the foothills and on range in the uplands.

Ducks and geese are fairly abundant in the Davis-Weber Area during fall and early in winter. In spring some of these birds nest in the marshes along the lakeshore, in bottoms along streams, and in other wet areas.

Mule deer spend the winter along the eastern side of the survey area. The Ridd, Kilburn, Francis, Sterling, Timpanogos, Hillfield, and Parleys soils on the steep foothills and very steep terrace escarpments produce native brushy Gambel oak, sagebrush, and other vegetation that provide food and shelter for these animals. In severe winters when the snow in the Wasatch Mountains is deep, mule deer invade and seriously damage orchards in this area.

Muskrats are fairly abundant on the Saltair, Airport, Arave, Lakeshore, Logan, Roshe Springs, and Warm Springs soils along the lakeshore. These animals are trapped during winter for their pelts, but the value of the pelts fluctuates considerably from time to time.

The development of private fishponds for sport fishing and the production of frogs for specialized markets are increasing. Ponds of this kind can be constructed on the soils east of Layton and Kaysville because drainageways cross these soils in many areas.

Plants that have special value for wildlife food and cover can be established on most soils in the area. Information dealing with the cultural, mechanical, and biological techniques in managing wildlife habitats is available through both State and Federal agencies.

Engineering Applications [6]

Some soil properties are of special interest to engineers because they affect the construction, maintenance, and performance of roads, airports, pipelines, building foundations, facilities for water storage, erosion control structures, drainage systems, and sewage disposal systems. The properties most important to the engineer are permeability to water, shear strength, compaction characteristics, soil drainage, shrink-swell characteristics, grain size, plasticity, and reaction. Also important are depth to the water table, to bedrock, or to a hardpan; content of salt and alkali; and topography.

The information in this soil survey can be used by engineers to—

1. Make studies of soil and land use that aid in selecting and developing industrial, business, residential, and recreational sites.
2. Locate probable sources of sand, gravel, clay and other construction materials.
3. Make preliminary estimates of the engineering properties of soils in the planning of agricultural drainage systems, farm ponds, irrigation systems, and erosion control structures.
4. Make preliminary evaluations of the soil and the substratum that will aid in selecting locations for highways, airports, pipelines, and cables, and in planning detailed investigations at the selected locations.
5. Determine the suitability of soil mapping units for cross-country movement of vehicles and construction equipment.
6. Supplement the information obtained from other published maps and reports and from aerial photographs so as to make maps and reports that can be used readily by engineers.

With the soil map for identification, the engineering interpretations reported here can be useful for many purposes. It should be emphasized that they may not eliminate the need for sampling and testing at the site of specific engineering works that involve heavy loads or where the excavations are deeper than the depth of layers here reported. Even in these situations, however, the soil map is useful for planning more detailed field investigations and for suggesting the kinds of problems that may be expected.

Although the detailed soil map and the tables serve as a guide for evaluating most soils, a detailed investigation at the site of the proposed construction is needed because as much as 15 percent of an area designated as a specific soil on the map may consist of areas of other soils too small to be shown on the published map.

Much of the information in this section is in tables 5, 6, and 7. In table 5 properties of soils that are important to engineering are estimated. Table 6 indicates the suitability of soils for various engineering uses. Table 7 lists test data for soils of seven soil series represented in the survey area.

In addition to this subsection, "Descriptions of the Soils," "Formation, Morphology, and Classification of Soils," and other sections of the survey are useful to engineers. Some of the terms used by soil scientists may be unfamiliar to engineers. These terms, as well as other terms used in this soil survey, are defined in the Glossary.

[6] WILLIAM P. OGDEN and MERWIN COOK, engineers, Soil Conservation Service, assisted in preparing this subsection.

Engineering classification systems

Most highway engineers classify soil materials according to the system approved by the American Association of State Highway Officials (AASHO) (*1*). In this system soil materials are classified in seven principal groups. The groups range from A–1, consisting of gravelly and coarse sandy soils of high bearing capacity, to A–7, consisting of clayey soils having low strength when wet. Within each group the relative engineering value of the soil material is indicated by a group index number. These numbers range from 0 for the best material to 20 for the poorest. The AASHO classification of soils in the Davis-Weber Area is given in table 5.

Some engineers prefer to use the Unified soil classification system (*10*, *19*). In this system the soils are identified according to their texture and plasticity and are grouped according to their performance as engineering construction material. Soil materials are classified as coarse grained, which are gravels (G) and sands (S); fine grained, which are silts (M) and clays (C); and highly organic soils (O). In this system clean sands are identified by the symbols SW and SP; sands with fines of silt and clay are identified by the symbols SM and SC; silts and clays that have low liquid limit are identified by the symbols ML and CL; and silts and clays that have a high liquid limit are identified by the symbols MH and CH.

Engineering properties of soils

In table 5 are brief descriptions of the soils in the Davis-Weber Area and, for major soil layers, estimates of soil properties that affect engineering. Also, the major soil layers are classified according to the systems generally used by soil scientists of the U.S. Department of Agriculture and according to the Unified and AASHO engineering classifications. The percentages of soil material passing the Nos. 4, 10, and 200 sieves are estimated for each soil horizon.

It should be noted that silt and clay together with some very fine sand in the USDA classification are grouped into a fraction called fines in the Unified classification system. These terms are used in the Unified system to designate behavior of soil material rather than texture. For this reason, engineers in the Soil Conservation Service designate all soil materials finer than those passing No. 200 as fines and use their plasticity characteristics for making interpretations of their behavior under the loads of engineering structures. Conversely, these engineers use the USDA classification system in dealing with irrigation and drainage of soil for farming.

Permeability, or the movement of water downward through the soils, is estimated in table 5 in inches of soil depth per hour. The estimates are for the soil as it occurs in place, and they are made on the basis of soil structure and porosity.

TABLE 5.—*Estimated soil properties*

Soil series and symbols [1]	Description of soil and site	Depth from surface	Classification		
			USDA texture	Unified	AASHO
		Inches			
Abbott (Aa)	Deep, poorly drained, fine-textured soil moderately to strongly affected by salt and alkali; on low lake terraces; parent materials are mixed lake sediments; depth to the water table is generally 8 to 24 inches.	0–37	Clay	CH	A–6 or A–7
		37–46	Sandy clay loam	SC or CL	A–4 or A–6
		46–61	Loamy very fine sand.	SM or SP	A–2
Ackmen (AbB, AbC, AbD, AbE2).	Deep, well-drained, medium-textured soils on uplands; noncalcareous; parent materials derived mainly from gneiss, schist, granite, and quartzite.	0–60	Loam	ML or SM	A–4
Airport (Ac, Ad, Ae, AF) (For properties of the Ford soil in mapping unit AF, refer to the Ford Series.)	Deep, somewhat poorly drained and poorly drained, medium-textured and moderately fine textured soils slightly to strongly affected by salt and alkali; on low lake terraces; parent materials are mixed lake sediments derived from many kinds of rocks; depth to the water table is generally 10 to 48 inches.	0–60	Silty clay loam	CL	A–4 or A–6
Arave (AS) (For properties of Saltair soils in this mapping unit, refer to the Saltair series.)	Deep, poorly drained, medium-textured soil moderately to strongly affected by salt and alkali; on low lake terraces and lake plains; parent materials are mixed lake sediments derived from many kinds of rocks; depth to the water table is generally 24 to 36 inches.	0–60	Clay loam	ML or CL	A–4 or A–6
Barton (BaE, BrG)	Well-drained, gravelly, cobbly, or stony, medium-textured soils; on foothills of Little Mountain; below a depth of 2 feet, cobbles and stones make up 50 to 80 percent of the soil mass; parent materials are alluvium and residuum derived from massive tillite; depth to bedrock is generally more than 4 feet.	0–19	Gravelly or stony loam	SM	A–2 or A–4
		19–31	Very cobbly sandy loam.	GM	A–1
Chance (CaA, CIA) (For properties of Ironton soils in mapping unit CIA, refer to the Ironton series.)	Deep, poorly drained, noncalcareous soils; on low terraces and flood plains; parent materials are alluvium and reworked sediments derived mainly from gneiss, schist, and granite; the water table is generally within 30 inches of the surface.	0–19	Loam or silt loam	OL, ML, or CL	A–4 or A–6
		19–72	Loamy fine sand and fine sandy loam.	SM or ML	A–4 or A–2
Croy (Cr)	Moderately deep to hardpan, somewhat poorly drained, medium-textured soil moderately affected by salt and alkali; on low lake terraces; thickness of hardpan ranges from 3 to 40 inches; parent materials are mixed lake sediments; depth to the water table is generally 30 to 48 inches.	0–18	Loam and sandy clay loam	CL, ML, or SC	A–4 or A–6
		18–32	Sandy loam and fine sand.	SM	A–2 or A–4
		32–35	Indurated hardpan.		
Cudahy (CuA)	Moderately deep to hardpan, poorly drained, calcareous soil; on low lake terraces; depth to hardpan ranges from 20 to 40 inches.	0–23	Silt loam	OL or ML	A–4
		23–44	Cemented hardpan.		
		44–60	Silty clay loam	ML or CL	A–4 or A–6

See footnote at end of table.

significant to engineering

Percentage passing sieve—			Permeability	Available water capacity	Reaction	Salinity	Dispersion	Shrink-swell potential
No. 4 (4.76 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)	*Inches per hr.*	*Inches per inch of depth*	*pH*			
100	100	75–95	<0. 2	0. 16–0. 18	8. 6–9. 5	Moderate to severe	High	High.
100	100	40–60	0. 2–0. 63	0. 15–0. 18	7. 8–8. 5	None	Moderate	Moderate.
100	100	15–20	>6. 3	0. 07–0. 08	7. 8–8. 5	None	None	Low.
90–100	80–100	50–60	0. 63–2. 0	0. 17	7. 0–7. 8	None	Low	Low.
100	100	80–95	<0. 2	0. 16–0. 18	7. 8–9. 6	Slight to severe	Moderate	Moderate.
100	100	65–75	0. 063–0. 2	0. 15–0. 17	8. 6–10. 0	Moderate	High	Moderate.
60–70	45–70	25–50	0. 63–6. 3	0. 10–0. 12	6. 6–7. 3	None	Low	Low.
30–50	30–50	15–25	>6. 3	0. 06–0. 07	7. 0–8. 4	None	Low	Low.
100	90–100	75–85	0. 63–2. 0	0. 17–0. 18	7. 4–7. 8	None	None	Moderate.
100	90–100	20–65	2. 0–6. 3	0. 14–0. 16	7. 8–8. 5	None	None	Low.
100	100	45–60	0. 2–0. 63	0. 14–0. 16	7. 8–9. 0	Moderate	Moderate	Moderate.
100	100	25–50	>6. 3	0. 9–0. 11	9. 0–10. 0	Moderate	Moderate	Low.
			<0. 63					
100	100	70–90	0. 63–2. 0	0. 18–0. 20	7. 8–8. 5	None to moderate	Low	Low.
			<0. 063					
90–100	90–100	60–80	0. 2–0. 63	0. 17–0. 19	7. 8–8. 5	None	Low	Moderate.

TABLE 5.—*Estimated soil properties*

Soil series and symbols [1]	Description of soil and site	Depth from surface	Classification		
			USDA texture	Unified	AASHO
		Inches			
Draper (DaA, DaB, DrA, DrB, DrC, DsB, DsC).	Deep, somewhat poorly drained, medium-textured soils; on alluvial fans and flood plains; parent materials were derived mainly from gneiss, schist, and quartzite; depth to the water table is generally 20 to 48 inches.	0–21	Loam	OL or CL	A–4
		21–60	Loam	CL–ML	A–4
Ford (Fa, Fb)	Moderately deep to hardpan, somewhat poorly and poorly drained, medium-textured soils moderately affected by salt and alkali; on low lake terraces; depth to the hardpan ranges from about 20 to 40 inches, and thickness of the pan ranges from 3 to 24 inches; parent materials are mixed lake sediments; depth to the water table is generally 30 to 36 inches.	0–16	Loam	ML, CL, or SM.	A–4
		16–34	Fine sandy loam	SM	A–4 or A–2
		34–44	Cemented hardpan.		
		44–52	Fine sandy loam	SM	A–2
		52–60	Cemented hardpan.		
Francis (FcB, FcC, FcD, FcE2, FcF2, FKG2). (For properties of Kidman soils in mapping unit FKG2, refer to the Kidman series.)	Deep, somewhat excessively drained, coarse-textured soils; on high lake terraces; parent materials are wind-laid deposits; calcareous lake sediments are at depths of 6 feet or more; hazard of soil blowing is high.	0–23	Loamy fine sand	SM	A–2
		23–73	Fine sand	SM or SM–SP.	A–1
Gooch (Go, Gs)	Deep, poorly drained and somewhat poorly drained, medium-textured soils strongly affected by salt and alkali in some places; on low lake terraces; parent materials are mixed lake sediments derived from many kinds of rocks; depth to the water table is generally 20 to 40 inches.	0–30	Clay loam	CL	A–4 or A–6
		30–47	Fine sandy loam	SM	A–2 or A–4
Harrisville (HaA, HaB, HaC, HLA). (For properties of Leland soil in mapping unit HLA, refer to the Leland series.)	Deep, somewhat poorly drained and moderately well drained, medium-textured soils slightly to moderately affected by alkali; strongly calcareous below a depth of about 15 inches; parent materials are mixed lake sediments; depth to the water table is generally 30 to 48 inches.	0–60	Silty clay loam	CL	A–4 or A–6
Hillfield (HMG2, HnD2, HnE2, HTF2, HTG2). (For properties of the Marriott soil in mapping unit HMG2, those of Timpanogos soils in units HTF2 and HTG2, and those of Parleys soils in units HTF2 and HTG2, refer to the Marriott, Timpanogos, and Parleys series, respectively.)	Deep, well-drained, medium-textured soils that are strongly calcareous; on terrace escarpments; parent materials are mixed lake sediments.	0–21	Silt loam	ML	A–4
		21–60	Stratified very fine sandy loam and clay loam.	ML	A–4
Ironton (IaA, IaB, IaC, IcA, IDA). (For properties of Draper soils in mapping unit IDA, refer to the Draper Series.)	Deep, somewhat poorly drained and moderately well drained, medium-textured soils that are strongly calcareous; on low lake terraces and flood plains; parent materials are mixed lake sediments; depth to the water table is generally 24 to 48 inches.	0–60	Silt loam	ML	A–4

See footnote at end of table.

significant to engineering—Continued

Percentage passing sieve—			Permeability	Available water capacity	Reaction	Salinity	Dispersion	Shrink-swell potential
No. 4 (4.76 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)						
			Inches per hr.	*Inches per inch of depth*	*pH*			
90–100	90–100	60–70	0. 63–2. 0	0. 15–0. 17	7. 4–7. 8	None	Low	Moderate.
90–100	90–100	50–60	0. 63–2. 0	0. 15–0. 17	7. 0–8. 5	None	Low	Moderate.
100	100	45–55	0. 63–2. 0	0. 13–0. 15	9. 0–10. 0	Moderate	Low	Moderate.
100	90–100	30–40	0. 63–2. 0	0. 12–0. 14	9. 0–10. 0	Moderate	Low	Low.
			<0. 063					
90–100	90–100	20–30	0. 63–2. 0	0. 10–0. 12	9. 0–10. 0	Moderate	Low	Low.
			<0. 063					
100	95–100	15–25	>6. 3	0. 08–0. 09	7. 4–8. 5	None	None	Low.
100	90–100	10–15	>6. 3	0. 06–0. 08	7. 4–7. 8	None	None	Low.
100	95–100	70–80	0. 063–0. 2	0. 15–0. 17	7. 8–9. 0	Slight to severe	Moderate	Moderate.
100	95–100	30–40	2. 0–6. 3	0. 12–0. 14	8. 6–9. 0	Slight to severe	Moderate	Low.
100	95–100	85–95	0. 063–0. 2	0. 15–0. 17	7. 8–10. 0	Slight to moderate	Moderate	Moderate.
100	90–100	60–70	0. 63–2. 0	0. 15–0. 17	7. 4–8. 5	None	Moderate	Low.
100	90–100	50–60	0. 2–2. 0	0. 15–0. 17	7. 8–8. 5	None	Moderate	Low.
100	100	70–80	0. 63–2. 0	0. 17–0. 19	8. 0–8. 5	None to slight	None	Low to moderate.

TABLE 5.—*Estimated soil properties*

Soil series and symbols [1]	Description of soil and site	Depth from surface	Classification		
			USDA texture	Unified	AASHO
		Inches			
Kidman (KaA, KaB, KaC, KaD, KaE2).	Deep, well drained and moderately well drained, coarse-textured soils; on broad lake terraces; parent materials are mixed lakeshore deposits that have been extensively reworked by wind; in the moderately well drained soils, the water table is generally at a depth of 40 to 60 inches.	0–58	Fine sandy loam	ML, CL or ML–CL.	A–4
Kilburn (KbA, KbB, KbC, KcA, KfE2, KfF2, KfG2, KgB, KgC, KgD, KgE2, KlC, KlE2, KmA, KmC). (For properties of Francis soils in mapping units KfE2, KfF2, and KfG2, refer to the Francis series.)	Deep and moderately deep, well-drained and somewhat excessively drained, moderately coarse textured soils that are noncalcareous; on alluvial fans in the uplands; upper part is 10 to 50 percent gravel and cobbles, by volume, and the lower part is 25 to 80 percent gravel and cobbles; parent materials are alluvium and colluvium derived mainly from gneiss, quartzite, and granite.	0–11	Gravelly sandy loam.	SM or GM	A–2
		11–60	Very gravelly sandy loam.	GM, GM–GW, or SM.	A–1
Kirkham (Kr, Ks, Kt, KX) (For properties of Airport soils in mapping unit KX, refer to the Airport series.)	Deep, somewhat poorly drained, moderately fine textured soils slightly to strongly affected by salt and alkali; on flood plains; parent material is mixed alluvium; depth to the water table is generally 20 to 50 inches.	0–34	Silty clay loam	CH	A–6 or A–7
		34–68	Silt loam and fine sandy loam.	ML	A–4
Lakeshore (La,Lb)	Deep, poorly drained and very poorly drained, medium-textured soils strongly affected by salt; on lake plains; parent materials are mixed lake sediments derived from many kinds of rocks; the water table is at or near the surface most of the time.	0–51	Silt loam	ML	A–4 or A–6
Layton (LcB, LcC, LcD, LdB)	Deep, well drained and moderately well drained, coarse-textured soils; on intermediate and high lake terraces; parent materials are lakeshore deposits that have been modified by wind; in the moderately well drained soils, the water table is generally at a depth of 40 to 60 inches.	0–66	Loamy fine sand	SM	A–2
Leland (Le, LhA, Lp, Ls) (For properties of Harrisville soils in mapping unit LhA, those of Airport and of Croy in unit Lp, and those of Saltair in unit Ls, refer to the Harrisville, Airport, Croy, and Saltair series, respectively.)	Deep, somewhat poorly drained and moderately well drained, medium-textured soils moderately to strongly affected by salt and alkali; on low lake terraces; parent materials are mixed lake sediments derived from many kinds of rocks; depth to the water table is generally 48 to 60 inches.	0–38	Silt loam or clay loam.	ML or ML–CL.	A–7
		38–58	Very fine sandy clay loam and very fine sandy loam.	ML or ML–CL.	A–4

See footnote at end of table.

significant to engineering—Continued

Percentage passing sieve—			Permeability	Available water capacity	Reaction	Salinity	Dispersion	Shrink-swell potential
No. 4 (4.76 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)						
			Inches per hr.	*Inches per inch of depth*	*pH*			
100	100	50–60	2. 0–6. 3	0. 10–0. 12	7. 2–8. 0	None	None	Low.
50–90	60–90	25–35	>6. 3	0. 08–0. 10	6. 1–6. 5	None	None	Low.
30–80	40–75	5–15	>6. 3	0. 05–0. 06	6. 1–6. 5	None	None	Low.
100	100	90–95	0. 2–0. 63	0. 15–0. 17	7. 4–8. 5	Slight to moderate	Low	High.
100	100	50–70	0. 2–2. 0	0. 14–0. 16	7. 8–9. 6	Slight to severe	Moderate	Low.
100	95–100	65–75	0. 063–0. 2	0. 15–0. 17	7. 4–8. 5	Severe	Moderate	Low.
100	90–100	20–30	>6. 3	0. 08–0. 10	7. 3–9. 0	None	None	Low.
100	100	80–90	<0. 2	0. 14–0. 16	8. 6–10. 5+	Moderate to severe.	High	Moderate.
100	100	60–70	0. 63–0. 2	0. 14–0. 16	9. 5–10. 5+	Severe to very severe.	High	Moderate.

TABLE 5.—*Estimated soil properties*

Soil series and symbols [1]	Description of soil and site	Depth from surface	Classification		
			USDA texture	Unified	AASHO
		Inches			
Logan (Lt, Lu, Lw)	Deep, poorly drained and very poorly drained, moderately fine textured soils moderately affected by salt and alkali in places; on low lake terraces; parent materials are mixed alluvium and reworked lake sediments; the water table is at or near the surface.	0–12	Silty clay loam	OL or OH	A–6
		12–29	Silty clay loam	CL or CH	A–6
		29–60	Stratified loam	ML	A–4 or A–6
Marriott (McE2, MgD, MgE2)	Deep, somewhat poorly drained and well-drained, moderately coarse textured soils that are strongly calcareous in places; on lake terrace escarpments and terraces; parent materials are mixed lake sediments; the water table is below a depth of 60 inches.	0–22	Gravelly fine sandy loam.	SM or GM	A–2
		22–61	Gravelly fine sandy loam.	SM or GM	A–2
Martini (MrA, MtA)	Deep, moderately well drained, moderately coarse textured soils that are highly stratified; on river flood plains; depth to the water table is about 32 to 60 inches.	0–70	Fine sandy loam	SM	A–2
Parleys (PaA, PaB, PaC, PaD, PaE2).	Deep, well-drained, medium-textured soils with accumulated lime at a depth of 18 to 38 inches; on intermediate and high lake terraces; parent materials are mixed lake sediments; depth to the water table is 36 to 60 inches.	0–15	Loam	ML or CL	A–4 or A–6
		15–33	Clay loam	CL	A–4 or A–6
		33–60	Silt loam	CL, ML	A–4 or A–6
Payson (PMA, PNA) (For properties of Airport soils in mapping unit PMA, and those of Warm Springs soils in unit PNA, refer to the Airport and Warm Springs series, respectively.)	Deep, somewhat poorly drained and moderately well drained, medium-textured soils slightly to strongly affected by salt and alkali; on low lake terraces; parent materials are mixed lake sediments; depth to the water table is generally between 20 and 48 inches.	0–4	Silt loam	ML	A–4
		4–24	Clay	CH	A–7
		24–30	Silt loam	CL	A–4
Pleasant View (PvB, PvC, PvD, PvE, PvE2, PwC, PwD).	Deep, well-drained, medium-textured and moderately coarse textured soils that are finely gravelly or gravelly in places; on alluvial and colluvial fans in the uplands.	0–25	Loam and sandy loam.	SM or ML	A–4
		25–34	Fine gravelly loam.	SM or ML	A–4
		34–67	Fine gravelly fine sandy loam.	SM	A–2
Preston (PxB, PxE, PyB)	Deep, excessively drained, coarse-textured soils that formed in sands deposited by wind; on upland terraces.	0–65	Fine sand	SP	A–3
Refuge (Ra)	Deep, somewhat poorly drained, medium-textured and moderately coarse textured soil moderately to strongly affected by salt; on the lower flood plains; parent material is alluvium derived from many kinds of rocks; depth to the water table is generally 24 to 60 inches.	0–47	Loam	ML	A–4
		47–71	Fine sand	SM	A–2

See footnote at end of table.

significant to engineering—Continued

Percentage passing sieve—			Permeability	Available water capacity	Reaction	Salinity	Dispersion	Shrink-swell potential
No. 4 (4.76 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)						
			Inches per hr.	*Inches per inch of depth*	*pH*			
100	100	80–90	0. 2–0. 63	0. 17–0. 19	7. 5–8. 5	None to slight	None	Moderate.
100	100	80–90	<0. 2	0. 17–0. 19	7. 8–8. 9	None to moderate	None	Moderate.
100	100	80–90	0. 2–0. 63	0. 16–0. 17	8. 0–9. 0	None to slight	Low	Low to moderate.
50–80	60–85	20–30	>6. 3	0. 08–0. 10	7. 4–7. 8	None	None	Low.
30–80	55–90	20–30	>6. 3	0. 06–0. 08	7. 4–7. 8	None	None	Low.
85–100	90–100	20–30	2. 0–6. 3	0. 10–0. 12	7. 4–8. 5	None	Low	Low.
100	95–100	60–70	0. 63–2. 0	0. 16–0. 18	6. 6–7. 3	None	Low	Moderate.
100	95–100	70–80	0. 2–0. 63	0–16–0. 18	7. 0–7. 8	None	Low	Moderate.
100	95–100	70–80	0. 63–2. 0	0. 16–0. 18	7. 8–8. 5	None	Low	Moderate.
100	100	75–85	0. 2–0. 063	0. 16–0. 18	6. 6–7. 3	None to severe	Low	Low.
100	100	80–90	<0. 2	0. 15–0. 17	8. 6–9. 5	Slight to severe	Moderate to high.	High.
100	100	70–80	0. 2–0. 063	0. 10–0. 18	9. 0–10. 0	Slight to severe	Moderate	Moderate.
80–100	70–90	45–55	0. 63–2. 0	0. 14–0. 16	6. 6–7. 8	None	None	Low.
80–95	50–85	45–55	0. 63–2. 0	0. 10–0. 12	7. 4–7. 8	None	None	Low.
75–90	40–60	25–35	2. 0–6. 3	0. 09–0. 11	7. 8–8. 5	None	None	Low.
100	100	0–5	>6. 3	0. 04–0. 06	6. 6–7. 8	None	None	Low.
100	90–100	50–60	0. 2–2. 0	0. 10–0. 14	7. 4–9. 0	Moderate to severe.	Low	Low.
90–100	85–100	5–15	0. 2–2. 0	0. 08–0. 12	7. 8–8. 5	Moderate to severe.	Low	Low.

TABLE 5.—*Estimated soil properties*

Soil series and symbols [1]	Description of soil and site	Depth from surface	Classification		
			USDA texture	Unified	AASHO
		Inches			
Ridd (RdD, RkE2, RkG2)	Moderately deep or deep, well-drained, moderately coarse textured stony and rocky soils; on the foot slopes of the Wasatch Mountains; parent material is alluvium derived from gneiss, schist, quartzite, and granite; bedrock is at a depth of about 25 to 40 inches.	0–26	Stony sandy loam	GM or SM	A–2
		26–36	Very gravelly sandy loam.	GM or SM	A–2
Roshe Springs (Rs, Rt, Rw)	Deep, poorly drained and very poorly drained, medium-textured soils that are very strongly calcareous; on low lake terraces; parent materials are mixed, reworked lake sediments; depth to the water table is generally 0 to 20 inches.	0–52	Loam	OL or ML	A–4 or A–6
Saltair (Sa)	Deep, poorly drained to very poorly drained, moderately fine textured soil very strongly affected by salt; on lake plains; the water table is at or near the surface most of the time.	0–60	Silty clay loam	CL	A–6 or A–7
Steed (SbA, ScA, SdA, SeA)	Well drained and moderately well drained, moderately coarse textured soils that are gravelly in places; on river flood plains; parent material is mixed alluvium; the water table is generally below a depth of 40 inches.	0–17	Heavy fine sand to fine sandy loam with some gravel.	SM	A–2
		17–60	Very gravelly and cobbly coarse sand.	GM or GP	A–1
Sterling (SfD, SgE, ShF2)	Somewhat excessively drained, medium-textured very cobbly or very stony soils; on alluvial fans at the base of the Wasatch Mountains; parent material was derived mainly from limestone and quartzite.	0–16	Cobbly loam	GM	A–2 or A–4
		16–48	Very cobbly sandy loam.	GM	A–2
Sunset (SkA, SkB, SmA, SnA)	Deep or moderately deep to gravel and cobbles, somewhat poorly drained, medium-textured soils moderately to very strongly affected by salt and alkali in places; on stream flood plains; parent material is mixed alluvium; depth to the water table is generally 36 to 60 inches.	0–68	Loam	ML or CL	A–4
Syracuse (So, Sy)	Deep, somewhat poorly drained, coarse-textured soils slightly to strongly affected by salt and alkali; on low lake terraces.	0–60	Sandy loam	SM	A–2
Terminal (Ta)	Moderately deep to hardpan, somewhat poorly drained, medium-textured soil moderately affected by salt and alkali; parent materials are mixed lake sediments; depth to the water table is generally 36 to 48 inches.	0–22	Sandy clay loam	ML	A–4 or A–6
		22–24	Cemented hardpan.		
		24–72	Silty clay loam	CL	A–4 or A–6
Timpanogos (TbA, TbB, TbC, TbD2, TbE2).	Deep, well-drained, medium-textured soils; on intermediate and high lake terraces; parent materials are mixed lake sediments; the water table is at a depth of 36 to 48 inches.	0–39	Loam	ML or SM	A–4
		39–60	Fine sandy loam	SM	A–4

See footnote at end of table.

significant to engineering—Continued

Percentage passing sieve—			Permeability	Available water capacity	Reaction	Salinity	Dispersion	Shrink-swell potentia
No. 4 (4.76 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)						
			Inches per hr.	*Inches per inch of depth*	*pH*			
60–80	55–75	15–25	2. 0–6. 3	0. 08–0. 10	6. 6–7. 3	None	None	Low.
50–70	40–70	10–20	2. 0–6. 3	0. 06–0. 08	6. 6–7. 3	None	None	Low.
100	100	70–80	0. 63–2. 0	0. 17–0. 20	7. 4–7. 8	None	None	Moderate.
100	100	80–90	<0. 063	0. 16–0. 18	8. 6–10. 0	Severe	High	Moderate.
60–80	50–80	20–30	>6. 3	0. 08–0. 10	7. 8–8. 5	None	None	Low.
25–50	25–50	0–10	>6. 3	0. 04–0. 06	7. 8–8. 5	None	None	Low.
40–70	50–80	25–40	>6.3	0.08–0.10	7.4–7.8	None	None	Low.
30–50	30–50	10–20	>6.3	0.04–0.06	7.8–8.5	None	None	Low.
90–100	90–100	60–70	0.63–2.0	0.16–0.17	7.4–8.5	Moderate to severe.	Low	Low to moderate.
100	100	25–35	2.0–6.3	0.10–0.12	8.5–9.9	Slight to severe	None	Low.
100	100	50–60	0.2–0.63 <0.063	0.14–0.16	7.0–8.5	Moderate	Moderate	Moderate.
95–100	95–100	85–95	0.2–0.63	0.16–0.18	8.6–9.0	Moderate	Moderate	Moderate.
100	90–100	55–65	0.63–2.0	0.14–0.17	7.0–8.5	None	None	Moderate.
80–100	90–100	40–50	2.0–6.3	0.12–0.14	7.8–8.5	None	None	Low.

TABLE 5.—*Estimated soil properties*

Soil series and symbols [1]	Description of soil and site	Depth from surface	Classification		
			USDA texture	Unified	AASHO
		Inches			
Timpanogos, noncalcareous variant (TcD, TcE, TDD). (For properties of Draper soils in mapping unit TDD, refer to the Draper series.)	Deep, well-drained, medium-textured soils that are noncalcareous; on uplands; parent material was derived mainly from gneiss, schist, argillite, and quartz.	0–73	Very fine sandy loam.	SM	A–4
Trenton (TrB2, TrC3)	Deep, moderately well drained and somewhat poorly drained, medium-textured soils moderately affected by salt and alkali; on intermediate and low lake terraces.	0–33	Silty clay and silty clay loam.	CL or CH	A–7
		33–60	Stratified silty clay loam and silt loam.	CL	A–4 or A–6
Warm Springs (WaA, WaB, WdA, WgA, WhA, WlA).	Deep, somewhat poorly drained, moderately coarse textured soils slightly to strongly affected by salt and alkali; on broad low lake terraces; parent materials are mixed lake sediments; the water table is variable but is generally at a depth of 24 to 48 inches.	0–37	Fine sandy loam	SM	A–2
		37–60	Loamy fine sand	SM	A–2
Wayment (Wm, WR) (For properties of Refuge soils in mapping unit WR, refer to the Refuge series.)	Deep, poorly drained, moderately fine textured soils strongly affected by salt; on lower flood plains; parent materials are mixed alluvium and reworked lake sediments; the water table is at or near the surface most of the time.	0–63	Silty clay loam	CL	A–4 or A–6
Woods Cross (Ws, Wt)	Deep, poorly drained, moderately fine textured soils; on flood plains; parent material is alluvium derived from gneiss, schist, granite, and quartzite; depth to the water table is generally 24 to 48 inches.	0–37	Silty clay loam	OL or OH	A–7 or A–6
		37–72	Silty clay	MH or CH	A–6 or A–7

[1] Because Cobbly alluvial land (Co), Made land (Ma) and Rock outcrop (Ro) are variable, their properties were not estimated.

TABLE 6.—*Engineering*

[Because Cobbly alluvial land (Co), Made land (Ma), and Rock

Soil series and map symbols	Suitability as source of—			Soil features affecting—
	Topsoil	Sand and gravel	Road fill	Highway location
Abbott (Aa)	Not suitable	Not suitable	Poor; medium to low shearing strength; poor drainage; high compressibility; fair to poor compaction.	Water table within a depth of 20 inches; high plasticity; high susceptibility to frost action.

significant to engineering—Continued

Percentage passing sieve—			Permeability	Available water capacity	Reaction	Salinity	Dispersion	Shrink-swell potential
No. 4 (4.76 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)						
			Inches per hr.	*Inches per inch of depth*	*pH*			
100	95–100	40–50	0. 63–2. 0	0. 15–0. 17	6. 1–7. 3	None	Low	Low.
100	100	85–95	<0. 063	0. 15–0. 16	7. 0–8. 5	Moderate	Moderate	High.
100	100	85–95	0. 2–0. 063	0. 15–0. 16	8. 6–9. 6	Moderate	High	Moderate.
100	100	25–35	0. 63–2. 0	0. 12–0. 15	8. 0–9. 0	None to severe	Low	Low.
100	100	10–20	>6. 3	0. 08–0. 10	8. 7–10. 0	Slight to severe	Low	Low.
100	100	85–95	0. 2–0. 63	0. 16–0. 18	7. 4–8. 5	Severe	Moderate	Moderate.
100	100	80–90	0. 2–0. 63	0. 17–0. 20	7. 4–7. 8	None	None	Moderate to high.
100	100	85–95	0. 063–0. 2	0. 14–0. 17	7. 4–7. 8	None	None	High.

interpretations of soils

outcrop (Ro) are variable, interpretations for them were not made]

Soil features affecting—Continued				
Dikes or levees	Farm ponds		Agricultural drainage	Irrigation
	Reservoir areas	Embankments		
Very slow permeability; permanently wet; high shrink-swell potential; cracks when dry; fair to poor compaction; high compressibility; medium to low shearing strength.	Very slow permeability; high shrink-swell potential; slow seepage.	Low stability and strength; very slow permeability; cracks when dry; high shrink-swell potential; high compressibility; fair to poor compaction; medium to low shearing strength.	High water table; most areas are in depressions with no outlets; fine textured and very difficult to drain.	Not suitable for cultivation; high water-holding capacity.

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability as source of—			Soil features affecting—
	Topsoil	Sand and gravel	Road fill	Highway location
Ackmen (AbB, AbC, AbD, AbE2)	Good	Not suitable; gravelly and cobbly substratum is good for road subbase.	Fair to good if slopes are flat; easily eroded; moderate shearing strength; low resistance to cracking; slight to medium compressibility; good to poor compaction.	Water table generally at a depth of 60 inches; low plasticity; medium susceptibility to frost action.
Airport (Ac, Ad, Ae, AF) (For interpretations of Ford soils in mapping unit AF, refer to the Ford series.)	Surface layer fair	Not suitable	Fair if slopes are flat; medium shearing strength; medium to low resistance to cracking; medium compressibility; good to poor compaction.	Water table generally at 20 to 40 inches; slightly to strongly affected by salt and alkali; low plasticity; high susceptibility to frost action.
Arave (AS) (For interpretations of Saltair soils in this mapping unit, refer to the Saltair series.)	Poor	Not suitable	Poor; medium shearing strength; medium to low resistance to cracking; medium compressibility; good to poor compaction.	Water table generally within a depth of 20 inches; moderately to strongly affected by salt and alkali; low plasticity; high susceptibility to frost action.
Barton (BaE, BrG)	Not suitable	Poor for concrete; good for road subgrade.	Good; medium to high shearing strength; medium resistance to cracking; slight compressibility; good compaction.	Bouldery and rocky; low plasticity; low to medium susceptibility to frost action.
Chance (CaA, CIA) (For interpretations of Ironton soils in mapping unit CIA, refer to the Ironton series.)	Poor	Not suitable	Poor to fair; easily eroded; medium shearing strength when mixed; low resistance to cracking; slight to medium compressibility; good to poor compaction.	Water table within a depth of 20 inches; moderate to slow permeability; high susceptibility to frost action.

interpretations of soils—Continued

Soil features affecting—Continued				
Dikes or levees	Farm ponds		Agricultural drainage	Irrigation
	Reservoir areas	Embankments		
Moderate permeability; fair sealing ability; medium shearing strength; low resistance to piping and cracking; slight to medium compressibility; good to poor compaction.	Moderate to rapid seepage; moderate permeability; gravelly, rapidly permeable substratum in places.	Moderate stability and strength when compacted; fairly high organic-matter content; low resistance to piping and cracking; medium shearing strength; slight to medium compressibility; good to poor compaction.	Deep to water table; moderate permeability; drainage not needed.	High water-holding capacity; good intake rate.
Lime accumulation at a depth of 20 to 30 inches; moderate to slow permeability; water table at a depth of 20 to 40 inches; good to poor compaction; medium shearing strength.	Moderate seepage; moderate to slow permeability; slightly to strongly affected by salt and alkali.	Adequate strength and stability when mixed; toe drains and clay blanket may be needed; moderate to slow permeability; medium shearing strength; good to poor compaction; medium to low resistance to piping and cracking; medium compressibility.	Seasonally high water table; moderate to slow permeability; often stratified; slightly to strongly affected by salt and alkali; drainage and reclamation needed for cultivated crops.	High water-holding capacity.
Lime accumulation at a depth of 15 to 30 inches; slow permeability; water table generally within a depth of 20 inches; medium to low resistance to cracking; good to poor compaction.	Moderate seepage; moderately slow or slow permeability; moderately to strongly affected by salt and alkali.	Adequate strength and stability when mixed; toe drains and clay blankets may be needed; slow permeability; medium to low resistance to piping and cracking; medium compressibility; good to poor compaction.	Seasonally high water table; moderately slow to slow permeability; not suitable for cultivation; very difficult to drain and reclaim; outlets for water not available in most areas.	High water-holding capacity; not suitable for cultivation because of salt, alkali, and a high water table.
Good stability; moderate permeability; medium to high shearing strength; medium resistance to cracking and piping; good compaction.	Rapid seepage; moderate permeability; very cobbly and stony below a depth of 3 feet.	Moderate strength and stability; close control needed; moderate permeability; stony and cobbly; medium resistance to piping and cracking; slight compressibility; good compaction.	Not needed	Not suitable for cultivation because of stones; irrigation water not available.
Fair stability; water table within a depth of 20 inches; ponded in some areas; medium shearing strength when mixed; low resistance to piping and cracking; slight to medium compressibility; good to poor compaction.	Moderate permeability; seepage may be rapid in SM material.	Good for embankments; seepage control not required; medium shearing strength when mixed; low resistance to piping and cracking; slight to medium compressibility; good to poor compaction.	High water table; moderate to slow permeability; outlets for drainage may be lacking.	Good water-holding capacity.

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability as source of—			Soil features affecting—
	Topsoil	Sand and gravel	Road fill	Highway location
Croy (Cr)	Poor	Not suitable	Fair if slopes are flat; easily eroded; high content of salt and alkali; medium shearing strength; medium compressibility; good to poor compaction.	Water table at a depth of 20 to 40 inches; hardpan begins at about 35 inches; low plasticity; high susceptibility to frost action.
Cudahy (CuA)	Surface layer fair	Not suitable	Not suitable	Water table generally within a depth of 20 inches; low plasticity; high susceptibility to frost action.
Draper (DaA, DaB, DrA, DrB, DrC, DsB, DsC).	Surface layer good	Not suitable	Unsuitable in top 20 inches; fair to good below 20 inches if slopes are flat.	Water table generally at a depth of 20 to 40 inches; low plasticity; medium susceptibility to frost action.
Ford (Fa, Fb)	Poor	Not suitable	Fair if slopes are flat; easily eroded; medium shearing strength; low resistance to cracking; good compaction.	Water table within a depth of 40 inches; medium to high susceptibility to frost heaving; low plasticity.
Francis (FcB, FcC, FcD, FcE2, FcF2, FKG2). (For interpretations of Kidman soils in mapping unit FKG2, refer to the Kidman series.)	Good	Poor for sand; silt content too high.	Good; easily eroded; high shearing strength; medium resistance to cracking; slight compressibility; good compaction.	Deep to water table; low plasticity; medium to low susceptibility to frost heaving.
Gooch (Go, Gs)	Poor	Not suitable	Poor; high content of salt and alkali; medium shearing strength; medium compressibility; good to poor compaction.	Water table at a depth of less than 40 inches; subject to seepage and flooding; low to high plasticity; high susceptibility to frost action.

interpretations of soils—Continued

Soil features affecting—Continued				
Dikes or levees	Farm ponds		Agricultural drainage	Irrigation
	Reservoir areas	Embankments		
Slow to very slow permeability; fair stability; water table at a depth of 20 to 40 inches; medium shearing strength; medium to low resistance to piping and cracking; medium compressibility for material in the upper 18 inches, and slight for material below 18 inches; good to poor compaction.	Moderate seepage; very slow permeability in the hardpan.	Moderate stability and strength; slow to very slow permeability; medium to low resistance to cracking; good to poor compaction; toe drains needed.	High water table; high content of salt and alkali; hardpan is very difficult to dig, and may cause a perched water table; not generally suitable for cultivation.	Medium water-holding capacity; hardpan restricts root and water penetration.
Moderate to slow permeability; fair to poor stability; water table within a depth of 20 inches; high compressibility; low shearing strength; very poor compaction.	Moderate to slow seepage; moderate to slow permeability.	Not suitable for embankments; high organic-matter content.	Water table may be perched above a cemented hardpan; drainage needed for cultivated crops.	High water-holding capacity above the hardpan.
Unsuitable in top 20 inches; moderate permeability below 20 inches; fair stability; water table at a depth of 20 to 40 inches.	Moderate seepage; moderate permeability.	Unsuitable in top 20 inches; fairly high organic-matter content; low strength and stability; moderate permeability; below 20 inches, moderate shearing strength; low resistance to piping; medium to low resistance to cracking; good to poor compaction.	Moderately deep to water table; moderate permeability; drainage needed for deep-rooted crops; adequate outlets generally available.	High water-holding capacity; good intake rate.
Moderate to high water table; hardpan generally very slowly permeable; medium shearing strength; low resistance to piping and cracking; slight to medium compressibility; good to poor compaction.	Moderate seepage; hardpan generally very slowly permeable.	Moderate stability and strength; low resistance to piping and cracking; slight to medium compressibility; good to poor compaction; toe drains and cutoff needed.	Water table moderately deep or shallow; may be perched; moderately affected by salt and alkali; drainage and reclamation needed for cultivated crops.	Medium water-holding capacity; fair intake rate; hardpan restricts root penetration.
Rapid permeability; fair stability; high shearing strength; medium resistance to cracking; medium to low resistance to piping; slight compressibility; good compaction.	Rapid seepage; rapid permeability.	Adequate strength and stability; rapid permeability; medium resistance to cracking; medium to low resistance to piping; slight compressibility; good compaction; toe drains and cutoff needed.	Not needed	Low water-holding capacity; frequent irrigation needed; sprinklers needed for irrigating steeper slopes.
Fair stability; slow permeability; medium shearing strength; medium to low resistance to piping and cracking; medium compressibility; good to poor compaction.	Slow seepage; slow permeability.	Slow permeability; adequate strength and stability when mixed; semi-impervious after compaction; medium to low resistance to piping and cracking; medium compressibility; good to poor compaction; toe drains needed.	Slow permeability; high water table; outlets difficult; high content of salt and alkali; drainage and reclamation needed for cultivated crops.	High water-holding capacity.

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability as source of—			Soil features affecting—
	Topsoil	Sand and gravel	Road fill	Highway location
Harrisville (HaA, HaB, HaC, HLA) (For interpretations of Leland soils in mapping unit HLA, refer to the Leland series.)	Surface layer fair to poor.	Not suitable.	Poor to fair if slopes are flat; easily eroded; medium compressibility; medium to low resistance to cracking; good to poor compaction.	Water table at a depth of 20 to 40 inches; slightly to moderately affected by salt and alkali; medium to high susceptibility to frost heaving.
Hillfield (HMG2, HnD2, HnE2, HTF2, HTG2). (For interpretations of Marriott soils in mapping unit HMG2 and those of Timpanogos and of Parleys soils in units HTF2 and HTG2, refer to the Marriott, Timpanogos, and Parleys series, respectively.)	Fair	Not suitable.	Good; medium shearing strength; low resistance to cracking; slight to medium compressibility; good to poor compaction.	Medium to high susceptibility to frost action; fairly unstable on steeper slopes; low plasticity.
Ironton (IaA, IaB, IaC, IcA, IDA) (For interpretations of Draper soils in mapping unit IDA, refer to the Draper series.)	Surface layer fair.	Not suitable.	Poor; medium shearing strength; low resistance to cracking; slight to medium compressibility; good to poor compaction.	Water table at a depth of 20 to 40 inches; high susceptibility to frost action; low plasticity.
Kidman (KaA, KaB, KaC, KaD, KaE2).	Good	Poor for sand; generally no gravel.	Good; medium shearing strength; medium compressibility; low resistance to cracking; good to poor compaction.	Water table generally below a depth of 40 inches; low plasticity; low susceptibility to frost action.
Kilburn (KbA, KbB, KbC, KcA, KFE2, KFF2, KFG2, KgB, KgC, KgD, KgE2, KIC, KIE2, KmA, KmC). (For interpretations of Francis soils in mapping units KFE2, KFF2, and KFG2, refer to the Francis series.)	The surface layer is fair but is gravelly in places.	Substratum fair for gravel; good for road surface material.	Good; high shearing strength; slight compressibility; medium resistance to cracking; good compaction.	Deep to water table; stones and cobbles in places; low plasticity; low susceptibility to frost action.
Kirkham (Kr, Ks, Kt, KX) (For interpretations of Airport soils in mapping unit KX, refer to the Airport series.)	Fair to poor, depending on content of salt and alkali.	Not suitable.	Poor to fair if slopes are flat; slight to severe salinity; medium shearing strength; medium compressibility; low resistance to cracking; good to poor compaction.	Water table at a depth of 20 to 40 inches; medium susceptibility to frost action; low plasticity.

interpretations of soils—Continued

Soil features affecting—Continued				
Dikes or levees	Farm ponds		Agricultural drainage	Irrigation
	Reservoir areas	Embankments		
Slow and very slow permeability; water table at a depth of 20 to 40 inches; medium to low shearing strength; medium to low resistance to piping and cracking; good to poor compaction.	Moderate seepage; slow and very slow permeability.	Low stability and strength; close control of moisture needed on compaction; slow and very slow permeability; subsoil has low shearing strength and high compressibility; medium to low resistance to piping and cracking.	Seasonally high water table; slow or very slow permeability; moderately affected by salt and alkali; drainage and reclamation needed.	High water-holding capacity; fair intake rate.
Fair stability; moderate to slow permeability; medium shearing strength; low resistance to piping and cracking; slight to medium compressibility; good to poor compaction.	Slow to moderate seepage; steep slopes; moderate to slow permeability.	Adequate strength and stability; medium shearing strength; low resistance to piping and cracking; slight to medium compressibility; good to poor compaction; toe drains and cutoff needed.	Not needed	High water-holding capacity; steep slopes.
Fair stability; moderate permeability; water table at a depth of 20 to 40 inches; medium shearing strength; low resistance to piping and cracking; slight to medium compressibility; good to poor compaction.	Moderate to slow seepage; moderate permeability.	Low strength and stability; semi-impervious when properly compacted; moderate permeability; medium shearing strength; low resistance to piping and cracking; slight to medium compressibility; good to poor compaction; toe drains needed.	Moderately deep to water table; moderate to slow permeability; drainage needed for deep-rooted crops.	High water-holding capacity.
Good stability; moderate permeability; water table below a depth of 40 inches; medium shearing strength; medium compressibility; low resistance to piping and cracking; good to poor compaction.	Rapid seepage; moderate permeability.	Adequate stability and strength; semi-impervious after proper compaction; medium shearing strength; medium compressibility; low resistance to piping and cracking; good to poor compaction; toe drains needed.	Deep to water table; may require drainage in some areas.	Moderate water-holding capacity.
Good stability; rapid permeability; low shrink-swell potential; high shearing strength: slight compressibility; resistance is low to iping and medium to cracking; good compaction.	Rapid seepage; rapid permeability.	Moderate strength and stability; rapid permeability; high shearing strength; slight compressibility; resistance is low to piping, medium to cracking; good compaction.	Not needed	Low water-holding capacity; good intake rate; frequent irrigation required.
Fair stability; moderate to slow permeability; water table at a depth of 20 to 40 inches; medium shearing strength; medium compressibility; low resistance to piping and cracking; good to poor compaction.	Moderate seepage; moderate to slow permeability.	Low stability and strength; close moisture control needed; moderate to slow permeability; medium shearing strength; medium compressibility; low resistance to piping and cracking; good to poor compaction; toe drains needed.	Moderately deep to water table; slightly to strongly affected by salt and alkali; most areas need drainage.	Good water-holding capacity.

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability as source of—			Soil features affecting—
	Topsoil	Sand and gravel	Road fill	Highway location
Lakeshore (La, Lb)	Not suitable	Not suitable	Poor; very severe salinity; medium shearing strength; medium compressibility; low resistance to cracking; good to poor compaction.	Water table generally within a depth of 20 inches; high content of salt and alkali; high susceptibility to frost action; low plasticity.
Layton (LcB, LcC, LcD, LdB)	Good	Poor for sand; generally no gravel.	Good; high shearing strength; medium resistance to cracking; moderate permeability; slight compressibility; good compaction.	Water table below a depth of 40 inches; low susceptibility to frost action, low plasticity.
Leland (Le, LHA, LP, LS) (For interpretations of Harrisville soils in mapping unit LHA, those of Airport and Croy in unit LP, and those of Saltair in unit LS, refer to the Harrisville, Airport, and Saltair series, respectively.)	Poor	Not suitable	Poor to fair if slopes are flat; slight to severe salinity; moderate shearing strength; medium compressibility; low resistance to cracking; good to poor compaction.	Water table below a depth of 30 inches; medium to high susceptibility to frost action; low plasticity.
Logan (Lt, Lu, Lw)	Poor	Not suitable	Poor; low shearing strength; high compressibility; poor to very poor compaction.	Water table generally within a depth of 20 inches; some areas ponded; high susceptibility to frost action; low to high plasticity; surface layer is peaty in places.
Marriott (McE2)	Fair	Fair	Good; high shearing strength; medium resistance to cracking; moderate permeability; slight compressibility.	Good stability; low susceptibility to frost action; low plasticity.
Marriott, calcareous varient (MgD, MgE2).	Fair	Fair	Good; high shearing strength; medium resistance to cracking; moderate permeability; slight compressibility; good compaction.	Good stability; low to medium susceptibility to frost action; low plasticity.

interpretations of soils—Continued

Soil features affecting—Continued				
Dikes or levees	Farm ponds		Agricultural drainage	Irrigation
	Reservoir areas	Embankments		
Fair stability; moderate to slow permeability; water table generally within a depth of 20 inches; medium shearing strength; medium compressibility; low resistance to piping and cracking; good to poor compaction.	Slow seepage; moderate to slow permeability.	Low stability and strength; medium shearing strength; medium compressibility; low resistance to piping and cracking; good to poor compaction; medium to low permeability; toe drains needed.	Not suitable for cultivation; drainage and reclamation very difficult.	Moderate water-holding capacity.
Good stability; moderate permeability; water table below a depth of 40 inches; high shearing strength; resistance is medium to cracking, low to piping; slight compressibility; good compaction.	Rapid seepage; rapid permeability.	Moderate permeability; good stability; high shearing strength; medium resistance to piping; slight compressibility; good compaction; toe drains and cutoff needed.	Not generally needed	Low water-holding capacity.
Fair stability; slow permeability; water table below a depth of 20 inches; medium shearing strength; medium compressibility; low resistance to piping and cracking; good to poor compaction.	Slow seepage; slow permeability.	Adequate strength and stability when mixed; semi-impervious after proper compaction; medium shearing strength; medium compressibility; low resistance to piping and cracking; good to poor compaction; toe drains needed.	Drainage difficult because of low permeability; few outlets; high content of alkali and salt.	Medium water-holding capacity.
Fair stability; very slow permeability; water table generally within a depth of 20 inches; low shearing strength; high compressibility; poor to very poor compaction.	Slow seepage; very slow permeability.	Unstability and low strength; impervious after proper compaction; high content of organic matter; low shearing strength; high compressibility; resistance to piping and cracking variable; poor to very poor compaction.	High water table; drainage difficult; few outlets; drainage needed for cultivated crops.	High water-holding capacity.
Good stability; moderate permeability; high shearing strength; resistance medium to cracking, low to piping; slight compressibility; good compaction.	Rapid seepage; rapid permeability.	Adequate stability and strength; semi-impervious after proper compaction; high shearing strength; resistance medium to cracking, low to piping; slight compressibility; good compaction; toe drains and cutoff needed.	Not needed	Low water-holding capacity.
Good stability; moderate permeability; high shearing strength; resistance medium to cracking, low to piping; slight compressibility; good compaction.	Moderate seepage; moderate permeability.	Good stability and strength; semi-impervious after compaction; high shearing strength; resistance medium to cracking, low to piping; slight compressibility; good compaction; toe drains and cutoff needed.	Not needed	High water-holding capacity.

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability as source of—			Soil features affecting—
	Topsoil	Sand and gravel	Road fill	Highway location
Martini (MrA, MtA)	Good	Generally not suitable but fair in some areas.	Good; high shearing strength; medium resistance to cracking; moderate permeability; slight compressibility; good compaction.	Low plasticity; low susceptibility to frost action; water table at a depth of 20 to 40 inches.
Parleys (PaA, PaB, PaC, PaD, PaE2)	Good to fair	Not suitable	Poor to fair if slopes are flat; medium shearing strength; medium compressibility; medium to low resistance to cracking; good to poor compaction.	Water table below a depth of 40 inches; moderate to slow permeability; medium susceptibility to frost action; low plasticity.
Payson (PMA, PNA) (For interpretations of Airport soils in mapping unit PMA and of Warm Springs in unit PNA, refer to the Airport and Warm Springs series, respectively.)	Poor	Not suitable	Poor to fair if slopes are flat; medium to low shearing strength; medium to high compressibility; medium to high resistance to cracking; good to poor compaction.	Water table generally at a depth of 20 to 40 inches; high susceptibility to frost action; low to high plasticity.
Pleasant View (PvB, PvC, PvD, PvE, PvE2, PwC, PwD).	Surface layer fair to good.	Not suitable	Good; medium shearing strength; low resistance to cracking; slight to medium compressibility; good to poor compaction.	Fair stability on steeper slopes; medium susceptibility to frost action; low plasticity.
Preston (PxB, PxE, PyB)	Poor	Poor for sand; no gravel.	Fair to good; high shearing strength; medium resistance to cracking; slight compressibility.	Nonplastic; low susceptibility to frost action.

interpretations of soils—Continued

Soil features affecting—Continued				
Dikes or levees	Farm ponds		Agricultural drainage	Irrigation
	Reservoir areas	Embankments		
Good stability; moderate permeability; water table at a depth of 20 to 40 inches; high shearing strength; resistance medium to cracking, low to piping; slight compressibility; good compaction.	Rapid seepage; moderately rapid permeability.	Adequate stability and strength; semi-impervious after proper compaction; moderate permeability; high shearing strength; resistance medium to cracking, low to piping; sligh compressibility; good compaction; toe drains and cutoff needed.	Moderately deep to water table; requires drainage in some areas.	Moderately low water-holding capacity.
Good stability; moderate to slow permeability; medium to low shearing strength; medium to low resistance to piping and cracking; good to poor compaction.	Moderate seepage; moderate to slow permeability.	Low stability and strength; close moisture control needed; moderate to slow permeability; moderate to low shearing strength; high compressibility; medium to low resistance to piping and cracking; good to poor compaction.	Drainage needed in some areas.	High water-holding capacity.
Fair stability; slow or very slow permeability; water table generally at a depth of 20 to 40 inches; medium to low shearing strength; low to high resistance to piping and cracking; good to poor compaction.	Slow seepage; slow or very slow permeability.	Adequate strength and stability; semi-impervious after compaction; slow and very slow permeability; medium shearing strength; medium to high resistance to piping and cracking; good to poor compaction.	Drainage difficult because of slow permeability; few outlets; high content of salt and alkali; not generally suitable for cultivation.	Medium water-holding capacity.
Fair to good stability; moderate permeability; medium shearing strength; low resistance to piping and cracking; slight to medium compressibility; good to poor compaction.	Moderate seepage; moderate permeability.	Adequate stability and strength if slopes are flat; semi-impervious after compaction; moderate permeability; medium shearing strength; low resistance to piping and cracking; slight to medium compressibility; good to poor compaction; toe drains and cutoff needed.	Not needed	Moderate to high water-holding capacity.
Fair stability; highly susceptible to soil-blowing; rapid permeability; high shearing strength; resistance medium to cracking, medium to low to piping; slight compressibility.	Rapid seepage; rapid permeability.	Adequate strength and stability; semi-impervious after compaction; rapid permeability; resistance medium to cracking, medium to low to piping; slight compressibility; toe drains and cutoff needed.	Not needed	Low water-holding capacity; suited to sprinkler irrigation.

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability as source of—			Soil features affecting—
	Topsoil	Sand and gravel	Road fill	Highway location
Refuge (Ra)	Poor	Not suitable	Fair to poor; moderate to very severe salinity; medium shearing strength; low resistance to cracking; slight to medium compressibility; good to poor compaction.	Water table at a depth 20 to 40 inches; low plasticity; medium susceptibility to frost action.
Ridd (RdD, RkE2, RkG2)	Poor	Suitable below the surface layer in some areas; cobbles and stones occur throughout the profile.	Fair to good; high shearing strength; slight compressibility; medium resistance to cracking; good compaction.	Good stability; low to medium susceptibility to frost action; low plasticity.
Roshe Springs (Rs, Rt, Rw)	Fair to poor	Not suitable	Poor to fair if slopes are flat; medium to low shearing strength; low resistance to cracking; medium to high compressibility; good to very poor compaction.	Water table generally within a depth of 20 inches; high susceptibility to frost action; low to high plasticity; surface layer is peaty in some places.
Saltair (Sa)	Not suitable	Not suitable	Poor; medium to low shearing strength; high resistance to cracking; high compressibility; fair to very poor compaction.	Water table within a depth of 20 inches; ponded in most places; low to high plasticity; high susceptibility to frost action.
Steed (SbA, ScA, SdA, SeA)	Fair to poor	Fair to good; surface layer is too silty in most places; subsoil is fair to good for both sand and gravel.	Good; high shearing strength; medium resistance to cracking; slight compressibility; good compaction.	Water table below a depth of 40 inches; subject to flooding in places; low susceptibility to frost action; low plasticity.
Sterling (SfD, SgE, ShF2)	Not suitable	Not suitable	Fair to good; high shearing strength; medium resistance to cracking; slight compressibility; good compaction.	Boulders and rocks in places; medium susceptibility to frost action; low plasticity.

interpretations of soils—Continued

Soil features affecting—Continued				
Dikes or levees	Farm ponds		Agricultural drainage	Irrigation
	Reservoir areas	Embankments		
Fair stability; moderate to slow permeability; water table at a depth of 20 to 40 inches; medium shearing strength; low resistance to piping and cracking; slight to medium compressibility; good to poor compaction.	Moderate to rapid seepage; moderate to slow permeability.	Moderate to slow permeability; adequate strength and stability; semi-impervious after compaction; low resistance to piping and cracking; slight to medium compressibility; good to poor compaction; toe drains and cutoff needed.	Seasonally high water table; few outlets; strongly affected by salt below a depth of 20 inches; drainage and reclamation needed for cultivated crops.	High water-holding capacity; strongly affected by salt below a depth of 20 inches.
Good stability; moderate to rapid permeability; high shearing strength; slight compressibility; resistance low to piping, medium to cracking; good compaction.	Moderate to rapid permeability; high shearing strength; slight compressibility; resistance low to piping, medium to cracking; good compaction.	Moderate to rapid permeability; adequate strength and stability after compaction; high shearing strength; slight compressibility; resistance low to piping, medium to cracking; good compaction.	Not needed	Moderate water-holding capacity.
Fair stability; moderate to slow permeability; water table generally within a depth of 20 inches; medium to low shearing strength; low resistance to piping and cracking; medium to high compressibility; good to very poor compaction.	Slow seepage; moderate to slow permeability.	Adequate stability and strength; semi-impervious after compaction; high content of organic matter; medium to low shearing strength; low resistance to piping and cracking; medium to high compressibility; good to very poor compaction.	High water table; drainage needed for cultivated crops; few outlets.	High water-holding capacity.
Poor stability; very slow permeability; water table within a depth of 20 inches; ponded in most places; medium to low shearing strength; high resistance to piping and cracking; high compressibility; fair to very poor compaction.	Slow seepage; very slow permeability.	Low stability and strength; very slow permeability; medium to low shearing strength; high resistance to piping and cracking; high compressibility; fair to very poor compaction.	High water table; ponded in most places; no outlets; not suitable for cultivation; very strongly affected by salt and alkali.	Not suitable.
Good stability; rapid permeability; water table below a depth of 40 inches; high shearing strength; resistance low to piping, medium to cracking; slight compressibility; good compaction.	Rapid seepage; rapid permeability.	High strength and stability; semi-impervious after compaction; rapid permeability; resistance low to piping, moderate to low to cracking; slight compressibility; good compaction; toe drains and cutoff needed.	Moderately deep to water table; drainage may be needed in some places.	Low water-holding capacity; frequent irrigation required.
Good stability; rapid permeability; high shearing strength; resistance medium to cracking, low to piping; slight compressibility; good compaction.	Rapid seepage; subsoil is very cobbly and stony.	Rapid permeability; moderate stability and strength; high shearing strength; resistance medium to cracking, low to piping; slight compressibility; good compaction; toe drains needed.	Not needed	Low water-holding capacity.

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability as source of—			Soil features affecting—
	Topsoil	Sand and gravel	Road fill	Highway location
Sunset (SkA, SkB, SmA, SnA)	Good	Not suitable	Fair if slopes are flat; medium shearing strength; medium to low resistance to cracking; slight to medium compressibility; good to poor compaction.	Water table below a depth of 40 inches; low plasticity; medium susceptibility to frost action.
Syracuse (So, Sy)	Fair	Not suitable	Fair to good; high shearing strength; medium resistance to cracking; slight compressibility; good compaction.	Water table generally at a depth of 20 to 40 inches; low plasticity; low susceptibility to frost action.
Terminal (Ta)	Poor	Not suitable	Poor to fair if slopes are flat; medium to low shearing strength; low resistance to cracking; medium to high compressibility; good to poor compaction.	Water table at a depth of 20 to 40 inches; low to high plasticity; high susceptibility to frost action.
Timpanogos (TbA, TbB, TbC, TbD2, TbE2, TDD). (For interpretations of Draper soils in mapping unit TDD, refer to the Draper series.)	Good	Not suitable	Fair if slopes are flat; medium shearing strength; low resistance to cracking; slight to medium compressibility; good to poor compaction.	Moderately deep to water table in some places; low plasticity; medium susceptibility to frost action.
Timpanogos, noncalcareous variant (TcD, TcE).	Good	Not suitable	Fair if slopes are flat; easily eroded; medium shearing strength; low resistance to cracking; slight to medium compressibility; good to poor compaction.	Moderately deep to water table in places; low plasticity; medium susceptibility to frost action.

interpretations of soils—Continued

Soil features affecting—Continued				
Dikes or levees	Farm ponds		Agricultural drainage	Irrigation
	Reservoir areas	Embankments		
Fair stability; moderate permeability; water table below a depth of 40 inches; medium shearing strength; medium to low resistance to piping and cracking; slight to medium compressibility; good to poor compaction.	Moderate to rapid seepage; moderate permeability.	Adequate strength and stability; semi-impervious after compaction; moderate permeability; medium shearing strength; medium to low resistance to piping and cracking; slight to medium compressibility; good to poor compaction; toe drains needed.	Deep or moderately deep to water table; drainage needed in places for deep-rooted crops; moderately to strongly affected by salt and alkali in places.	High water-holding capacity.
Fair stability; moderately rapid permeability; water table generally at a depth of 20 to 40 inches; high shearing strength; medium resistance to piping and cracking; slight compressibility; good compaction.	Rapid seepage; moderately rapid permeability.	Adequate strength and stability; semi-impervious after compaction; high shearing strength; medium resistance to piping and cracking; slight compressibility; good compaction; toe drains and cutoff needed.	Moderately deep to water table; most areas have been drained, others require drainage for cultivated crops; slightly to moderately affected by salt and alkali.	Low water-holding capacity.
Fair stability; the hardpan is very slowly permeable; water table at a depth of 20 to 40 inches; medium to low shearing strength; low resistance to piping and cracking; medium to high compressibility; good to poor compaction.	Slow seepage; hardpan at depths ranging from 12 to 48 inches.	Unstability and low strength; semi-impervious after compaction; very slow permeability; medium to low shearing strength; low resistance to piping and cracking; medium to high compressibility; good to poor compaction.	Moderately deep to water table; not suitable for cultivation; moderately affected by salt and alkali; difficult to drain.	High water-holding capacity.
Fair stability; moderate permeability; medium shearing strength; low resistance to piping and cracking; slight to medium compressibility; good to poor compaction.	Moderate to rapid seepage; moderate permeability.	Adequate stability and strength if slopes are flat; semi-imprevious to impervious after compaction; moderate permeability; medium shearing strength; low resistance to piping and cracking; slight to medium compressibility; good to poor compaction; toe drains and cutoff needed.	Moderately deep to water table in some places; may require some drainage.	High water-holding capacity.
Fair stability; moderate permeability; medium shearing strength; low resistance to piping and cracking; slight to medium compressibility; good to poor comtion.	Moderate to rapid seepage; moderate permeability.	Adequate stability and strength if slopes are flat; semi-impervious after compaction; moderate permeability; medium shearing strength; low resistance to piping and cracking; slight to medium compressibility; good to poor compaction; toe drains and cutoff needed.	Not needed in most places; small areas require some drainage for cultivated crops.	High water-holding capacity.

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability as source of—			Soil features affecting—
	Topsoil	Sand and gravel	Road fill	Highway location
Trenton (TrB2, TrC3)	Poor	Not suitable	Fair if slopes are flat; medium shearing strength; medium compressibility; medium to low resistance to cracking; good to poor compaction.	Water table below a depth of 20 inches; high to low plasticity; high susceptibility to frost action.
Warm Springs (WaA, WaB, WdA, WgA, WhA, WIA).	Fair	Not suitable	Fair to good if slopes are flat; medium shearing strength; low resistance to cracking; slight to medium compressibility; good to poor compaction.	Water table below a depth of 20 inches; low plasticity; medium to low susceptibility to frost action.
Wayment (Wm, WR) (For interpretations of Refuge soils in mapping unit WR, refer to the Refuge series.)	Not suitable	Not suitable	Poor; medium shearing strength; medium compressibility; low resistance to cracking; good to poor compaction.	Water table within a depth of 20 inches; low plasticity; slow permeability; high susceptibility to frost action.
Woods Cross (Ws, Wt)	Poor	Not suitable	Poor to unsuitable; low shearing strength; very high compressibility; poor to very poor compaction.	Water table within a depth of 40 inches; low to high plasticity; high susceptibility to frost action.

interpretations of soils—Continued

Soil features affecting—Continued				
Dikes or levees	Farm ponds		Agricultural drainage	Irrigation
	Reservoir areas	Embankments		
Fair stability; very slow permeability; water table below a depth of 20 inches; medium to low shearing strength; medium to low resistance to piping and cracking; good to poor compaction.	Moderate to rapid seepage; very slow permeability.	Adequate stability and strength; toe drains and clay blanket may be needed; very slow permeability; medium shearing strength; high compressibility; medium to low resistance to piping and cracking; good to poor compaction.	Drainage and reclamation needed for cultivated crops; seasonally high water table; moderately affected by salt and alkali.	High water-holding capacity.
Fair stability; moderate permeability; water table below a depth of 20 inches; moderate shearing strength; low resistance to piping and cracking; slight to medium compressibility; good to poor compaction.	Moderate to rapid seepage; moderate permeability.	Adequate strength and stability; semi-impervious after compaction; moderate permeability; medium shearing strength; low resistance to piping and cracking; slight to medium compressibility; good to poor compaction; toe drains and cutoff needed.	Many areas have been drained; drainage and reclamation needed in other areas; slightly to moderately affected by salt and alkali; outlets scarce in some places.	Medium water-holding capacity.
Low stability; slow permeability; water table within a depth of 20 inches; medium shearing strength; medium compressibility; low resistance to piping and cracking; good to poor compaction.	Slow seepage; slow permeability.	Low stability and strength; slow permeability; close moisture control needed; medium shearing strength; medium compressibility; low resistance to piping and cracking; good to poor compaction; toe drains needed.	Not suitable for cultivation; high water table; ponded in many places; very strongly affected by salt; no outlets.	High water-holding capacity.
Fair stability; slow permeability; water table within a depth of 40 inches; low shearing strength; very high compressibility; poor to very poor compaction.	Slow seepage; slow permeability.	Not suitable; high content of organic matter; slow permeability; low shearing strength; very high compressibility; poor to very poor compaction.	High water table; drainage needed for cultivated crops.	High water-holding capacity.

TABLE 7.—*Engineering*

[Tests performed by the Bureau of Public Roads (BPR) in accordance with standard

Soil name and location	Depth	Horizon	Mechanical analysis [1]				
			Percentage passing sieve [2]				
			1½-in.	1-in.	¾-in.	⅜-in.	No. 4 (4.7 mm.)
Kilburn gravelly sandy loam:	*Inches*						
NW¼ of sec. 21, T. 5 N., R. 1 W.	0–9	Ap	100	97	91	75	68
	9–21	B2	100	94	86	73	65
	21–49	C1 and C2	[5] 93	82	72	53	42
NE¼ of sec. 11, T. 5 N., R. 2 W.	0–5	Ap	100	99	96	87	83
	5–17	B1 and B2	100	98	95	85	80
	17–40	C1 and C2	[8] 87	77	66	46	35
SW¼ of sec. 12, T. 5 N., R. 2 W.	0–9	A1	100	97	92	80	75
	9–24	B1 and B2	[9] 99	91	84	68	60
	24–54	C1 and C2	[9] 99	83	74	52	40
Kidman fine sandy loam:							
NW¼ of sec. 17, T. 6 N., R. 2 W.	0–7	Ap and A12					
	15–32	B22 and C1					
	32–65	C2ca and C3					
NW¼ of sec. 2, T. 6 N., R. 2 W.	0–14	Ap and A12					
	14–21	B2					
	27–54	C2ca and C3					
NW¼ of sec. 33, T. 7 N., R. 2 W.	0–19	Ap and A12					
	19–41	A13 and B2					
	41–58	C1ca and C2					
Layton loamy fine sand:							
SE¼ of sec. 34, T. 7 N., R. 2 W.	0–16	Ap and A12					
	16–24	AC					
	24–57	C3ca					
SW¼ of sec. 10, T. 5 N., R. 2 W.	0–27	Ap and A12					
	27–34	AC					
	34–50	C1ca					
	50–78	C2					
NW¼ of sec. 4, T. 6 N., R. 2 W.	0–15	Ap and A12					
	15–23	AC					
	23–66	Cca					
Leland silt loam:							
SE¼ of sec. 21, T. 6 N., R. 3 W.	0–8	A1 or A2					
	8–19	B2tca and B3ca					
	19–72	C4					
NW¼ of sec. 20, T. 5 N., R. 2 W.	0–12	A11 and A12					
	12–16	B21tca					
	16–21	B22tca					
	21–60	C3					
SW¼ of sec. 14, T. 6 N., R. 3 W.	0–7	A1 or A2					
	7–15	B2tca					
	23–66	C3					
Sunset loam:							
SE¼ of sec. 6, T. 5 N., R. 1 W.	0–18	Ap and A12					
	18–32	AC					
	32–68	C					
NE¼ of sec. 30, T. 6 N., R. 1 W.	0–20	Ap and AC					
	20–26	C					
NE¼ of sec. 18, T. 6 N., R. 2 W.	0–12	Ap					
	12–58	C					

See footnotes at end of table.

test data

procedures of the American Association of State Highway Officials (AASHO) (*1*)]

Mechanical analysis [1]—Continued							Liquid limit	Plasticity index	Classification	
Percentage passing sieve [2]—Con.			Percentage smaller than [2]—							
No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.			AASHO [3]	Unified [4]
65	55	35	31	21	12	8	19	3	A–2–4(0)	SM.
60	49	30	26	18	11	8	21	6	A–2–4(0)	GC–SC.
35	25	8	7	5	3	3	[6] NL	[7] NP	A–1–a(0)	GP–GM.
80	70	34	30	21	12	8	18	3	A–2–4(0)	SM.
76	67	33	30	20	11	8	18	4	A–2–4(0)	SM–SC.
29	24	6	6	5	3	3	NL	NP	A–1–a(0)	GW–GM.
72	65	34	29	18	10	8	18	1	A–2–4(0)	SM.
55	48	24	20	13	8	7	20	3	A–1–b(0)	GM.
33	24	8	6	5	2	2	NL	NP	A–1–a(0)	GW–GM.
----------	100	59	50	34	19	14	22	5	A–4(5)	ML–CL.
----------	100	52	45	28	17	13	20	3	A–4(3)	ML.
----------	100	83	73	42	19	12	24	3	A–4(8)	ML.
100	99	73	67	41	20	13	22	3	A–4(8)	ML.
100	99	79	72	48	28	22	27	10	A–4(8)	CL.
100	99	79	75	51	25	19	25	5	A–4(8)	ML–CL.
----------	100	60	49	30	18	14	21	2	A–4(5)	ML.
----------	----------	58	46	26	16	14	21	2	A–4(5)	ML.
----------	100	81	74	52	26	18	26	7	A–4(8)	ML–CL.
----------	100	40	33	19	11	8	NL	NP	A–4(1)	SM.
----------	100	39	31	18	11	9	NL	NP	A–4(1)	SM.
100	99	31	26	17	11	8	NL	NP	A–2–4(0)	SM.
100	99	22	15	11	9	7	NL	NP	A–2–4(0)	SM.
100	99	27	15	11	8	7	NL	NP	A–2–4(0)	SM.
100	99	30	21	13	10	8	NL	NP	A–2–4(0)	SM.
100	99	19	14	9	6	4	NL	NP	A–2–4(0)	SM.
100	99	29	24	16	9	7	NL	NP	A–2–4(0)	SM.
100	99	34	28	17	10	8	NL	NP	A–2–4(0)	SM.
100	97	22	17	12	7	5	NL	NP	A–2–4(0)	SM.
----------	----------	83	71	38	17	10	18	1	A–4(8)	ML.
100	99	80	68	52	41	30	45	23	A–7–6(14)	CL.
----------	----------	73	57	28	15	11	22	2	A–4(8)	ML.
----------	100	69	59	33	15	9	20	2	A–4(7)	ML.
100	95	69	61	43	29	23	26	8	A–4(7)	CL.
100	99	82	75	58	43	35	43	18	A–7–6(12)	ML–CL.
----------	----------	71	54	25	12	9	23	2	A–4(7)	ML.
100	99	88	81	47	19	12	23	3	A–4(8)	ML.
----------	100	92	87	70	53	41	42	21	A–7–6(13)	CL.
----------	100	78	71	44	21	15	25	7	A–4(8)	ML–CL.
----------	100	76	66	41	24	18	27	8	A–4(8)	CL.
----------	----------	82	69	40	22	16	27	6	A–4(8)	ML–CL.
----------	----------	86	77	48	25	19	28	9	A–4(8)	CL.
----------	----------	90	82	52	28	20	31	9	A–4(8)	ML–CL.
----------	----------	82	70	40	21	15	27	6	A–4(8)	ML–CL.
100	99	65	58	38	22	15	26	7	A–4(6)	ML–CL.
----------	100	66	58	35	19	14	23	3	A–4(6)	ML.

TABLE 7.—*Engineering*

Soil name and location	Depth	Horizon	Mechanical analysis [1]				
			Percentage passing sieve [2]				
			1½-in.	1-in.	¾-in.	⅜-in.	No. 4 (4.7 mm.)
	Inches						
Syracuse loamy fine sand:							
NE¼ of sec. 23, T. 5 N., R. 3 W.	0–18	A1 and C1					
	18–37	C1ca					
	37–66	C2					
SE¼ of sec. 12, T. 5 N., R. 3 W.	0–18	Ap and AC					
	18–38	C1ca and C2ca					
	38–62	C3ca					
SE¼ of sec. 15, T. 5 N., R. 3 W.	0–21	Ap and AC					
	21–54	C1ca					
	54–71	C2					
Warm Springs fine sandy loam:							
NE¼ of sec. 14, T. 5 N., R. 3 W.	0–15	Ap and A1					
	15–32	C1ca					
	32–74	C2					
SE¼ of sec. 17, T. 5 N., R. 2 W.	0–18	A and AC					
	18–46	C1ca					
	46–64	C2					
NW¼ of sec. 27, T. 6 N., R. 3 W.	0–15	A1 and C1ca					
	15–31	C2ca and C3ca					
	31–65	C4					

[1] Mechanical analysis according to AASHO Designation: T 88–57 (*1*). Results by this procedure may differ from results obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHO procedure, the fine material is analyzed by the hydrometer method, and the various grain-size fractions are calculated on the basis of all the material, including that coarser than 2 millimeters in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method, and the material coarser than 2 millimeters in diameter is excluded from calculations of grain-size fractions. The mechanical analysis data used in this table are not suitable for naming textural classes for soils.

[2] Based on total material; laboratory test data were corrected for amount discarded in field.

[3] Based on Standard Specifications for Highway Materials and Methods of Sampling and Testing (Pt. 1, Ed. 8): The Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes, AASHO Designation M 145–49.

Available water capacity, in inches per inch of soil depth, is the approximate amount of capillary water in the soil when the soil is wet to field capacity. When the soil is at the wilting point of common plants, this amount of water will wet it to a depth of 1 inch without further percolation.

Reaction is expressed in pH. A pH of 7.0 is neutral; values lower than 7.0 are acid, and values higher are alkaline. Knowledge of reaction is useful if pipelines are to be constructed, as it indicates, among other things, likelihood of corrosion.

The following ranges in millimhos per centimeter were used for making salinity ratings: Less than 2 millimhos, none; 2 to 4, slight; 4 to 8, moderate; 8 to 16, severe; and more than 16, very severe.

Dispersion refers to the degree and speed that structure breaks down or slakes in water. Knowledge of dispersion is helpful in designing and constructing highways or buildings.

Shrink-swell potential indicates the volume change that can be expected of soil material if there is a change in moisture content. It is estimated primarily on the basis of the amount and type of clay in the soil and is expressed as *low*, *moderate*, or *high*. In general, soils classified as CH or A–7 have a high shrink-swell potential. Clean sands and gravel (single grain) and others that contain a small amount of nonplastic or slightly plastic material have a low shrink-swell potential.

Engineering interpretations

In table 6 are estimates of the suitability of soils used as topsoil, sand and gravel, and road fill. Also given are soil features that affect highway location and the use of soils in soil and water conservation structures. The interpretations of these features and the ratings are based on the actual test data in table 7, on information in table 5, and on field experience.

Ratings and comments in table 6 indicate the suitability of soil material when it is used for different engineering purposes. With reference to the heading, "Suitability as source of topsoil," topsoil is defined as soil material useful for resurfacing shoulders of roads or other areas where vegetation is to be established and maintained. The properties important in evaluating soil

test data—Continued

Mechanical analysis [1]—Continued							Liquid limit	Plasticity index	Classification	
Percentage passing sieve [2]—Con.			Percentage smaller than [2]—						AASHO [3]	Unified [4]
No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.				
100	99	36	32	23	14	9	18	2	A-4(0)	SM.
100	99	29	26	22	16	13	NL	NP	A-2-4(0)	SM.
100	99	29	20	11	7	5	NL	NP	A-2-4(0)	SM.
100	95	30	27	18	10	7	NL	NP	A-2-4(0)	SM.
100	93	29	24	19	15	12	NL	NP	A-2-4(0)	SM.
100	96	15	11	9	6	4	NL	NP	A-2-4(0)	SM.
100	98	19	14	11	8	7	NL	NP	A-2-4(0)	SM.
100	99	28	21	14	11	9	NL	NP	A-2-4(0)	SM.
100	99	48	35	17	8	6	NL	NP	A-4(3)	SM.
100	99	31	26	18	11	9	NL	NP	A-2-4(0)	SM.
100	99	36	31	24	19	15	NL	NP	A-4(0)	SM.
100	99	30	21	13	8	7	NL	NP	A-2-4(0)	SM.
100	99	42	32	19	10	7	NL	NP	A-4(1)	SM.
----------	100	45	34	19	14	10	NL	NP	A-4(2)	SM.
100	98	23	14	7	3	3	NL	NP	A-2-4(0)	SM.
----------	100	52	45	25	13	9	20	2	A-4(3)	ML.
----------	100	46	37	26	19	14	18	2	A-4(2)	SM.
----------	100	53	42	20	10	7	NL	NP	A-4(4)	ML.

[4] Based on the Unified Soil Classification System, Technical Memorandum No. 3-357, v. 1 (*19*). SCS and BPR have agreed to consider that all soils having plasticity indexes within two points from A-line are to be given a borderline classification An example of borderline classification obtained by this use is ML-CL.

[5] 95 percent passes a 2-inch sieve, and 5 percent is larger than 3 inches in diameter.

[6] NL used in this column means nonliquid.

[7] NP used in this column means nonplastic.

[8] 92 percent passes a 2-inch sieve, and 8 percent is larger than 3 inches in diameter.

[9] 100 percent passes a 2-inch sieve.

material for this use are (1) productivity, (2) presence of coarse fragments, and (3) thickness of the material at its source. The suitability of soil as a source of topsoil is rated *good*, *fair*, *poor*, or *not suitable*.

Suitability of soils as a source of sand and gravel is rated *good*, *fair*, *poor*, and *not suitable*. The subsoil of the Steed soils is fair to good as sand and gravel in construction material, but most soils in the area are unsuitable or are poorly suited.

Road fill is defined as material that is used for building up road grades that support base layers. The important properties for evaluating this use of soil material are (1) shrink-swell potential, (2) traffic-supporting capacity, (3) inherent erodibility, and (4) thickness of the source material. The soil material is rated *good*, *fair*, *poor*, and *not suitable*.

The suitability of soils for highway location is based on (1) drainage, (2) depth to water table, (3) susceptibility to frost action, (4) workability of the soil material when it is wet, and (5) depth to bedrock. Ridd soils, for example, have good stability, low to medium susceptibility to frost action, and low plasticity.

Soil features that influence the suitability of soil material for dikes and levees are (1) permeability, (2) stability, (3) shrink-swell potential, and (4) compaction. Kilburn soils, for example, have good stability, rapid permeability, low shrink-swell potential, and good compaction.

Some of the soil features that affect engineering practices in reservoir areas are (1) susceptibility to seepage, (2) flood hazard, (3) permeability, (4) variability of soil materials, and (5) the water table. Leland soils make good reservoir areas because they have slow seepage and slow permeability. This soil material, however, is poor for embankments because it is unstable and has low strength, high organic-matter content, low shearing strength, variable resistance to piping and cracking, and poor compaction.

Soil features that affect agricultural drainage are topography, need for drainage, and location of outlets. The Refuge soils are difficult to drain because the water table is seasonally high, outlets may not be available, and the soil is strongly affected by salts below a depth of 20 inches.

Some of the soil features to consider in evaluating suitability for irrigation are intake rate, permeability, suitability for farming, and water-holding capacity. The steeper slopes of the Chance soils are best irrigated by sprinklers. Frequent irrigations are necessary because water-holding capacity is low.

Engineering test data

In table 7 the results of tests conducted on 21 samples from 7 soil series in Weber County are listed. The tests were conducted by the Bureau of Public Roads (BPR) according to standard procedures of the American Association of State Highway Officials (AASHO).

The tests for liquid limit and plastic limit measure the effects of water on the consistence of soil material. As the moisture content of a clayey soil is increased from a dry state, the material changes from a semisolid to a plastic state. As the moisture content is further increased, the material changes from a plastic to a liquid state. The plastic limit is the moisture content, on a dry basis, at which the soil material changes from a semisolid to a plastic state. The liquid limit is the moisture content at which the material changes from a plastic to a liquid state. The plasticity index is the numerical difference between the liquid limit and the plastic limit. It indicates the range of moisture content within which a soil material is plastic.

Use of Soils in Community Development

This subsection was prepared mainly to aid planning officials, realtors, landowners, and others interested in developing communities. Other information that is helpful in planning and zoning for communities and for developments for recreation and industrial expansion can be found in other parts of this soil survey.

In the Davis-Weber Area, there is a strong trend toward community and industrial expansion. Industrial, military, and commercial plants recently established in the area have created many new jobs and, in turn, have increased the need for family residences. Consequently, new homes have been constructed on many acres.

The population of the Davis-Weber Area increased from about 71,500 in 1950 to 174,500 in 1960, or about 240 percent. Approximately 14,000 new homes were built in the area between 1940 and 1960. The increase in population created a demand for schools, parks, playgrounds, golf courses, and other public services and facilities. The acreage used for community and industrial sites increased from about 20,000 acres in 1950 to 32,000 in 1960. This acreage is estimated by C. W. Townsend in an unpublished paper to increase to 45,000 by 1975.

The soil is a vital part of all building construction, community developments, landscaping, and recreational and industrial uses. In determining the suitability of soils for these uses, a knowledge of soil properties is necessary. Soil properties are described in considerable detail in the section "Descriptions of the Soils."

In table 8 the soils in the Davis-Weber Area are rated on the basis of characteristics and qualities that affect their use for (1) foundations for buildings, (2) septic tank systems, (3) soil corrosivity for untreated steel pipe and for concrete conduits, (4) landscaping, and (5) recreational uses.

Generally, soils are rated on the basis of limitations or hazards and placed in five classes. A rating of *very slight* means the soil is relatively free of limitations; *slight*, the soil has few limitations that are easily overcome; *moderate*, the soil has limitations of moderate amount or intensity that need to be recognized but can be overcome by correct planning, careful design, and good management; *severe*, the soil has limitations severe enough to make use of the soil questionable, and careful planning and above-average management are required; *very severe*, the soil has limitations that require extreme measures to overcome, and the use of the soil is generally not practical.

The main characteristics and qualities considered in making the ratings were drainage, depth to the water table, depth to a restricting layer, texture, kind of parent material, kind and amount of clay, permeability, content of salts and alkali, degree of slope, and stoniness. The ratings do not include other features that may be important in the selection of an area for a specific use. Unless otherwise stated, the ratings apply to material to a depth of only 5 feet.

TABLE 8.—*Limitations of soils for use in community development*

[A rating of *very slight* means the soil is practically free of limitations; *slight* means few limitations that are easily overcome; *moderate* means moderate limitations requiring careful planning and design; *severe* means the use of the soil is questionable; and *very severe* means the use of the soil is generally not practical. Absence of a rating indicates that the soils is not used for the purpose specified]

Map symbol	Soil	Low building foundations	Septic tank systems	Untreated steel pipe	Concrete conduits	Landscaping	Recreation areas
Aa	Abbott clay	Severe	Severe	Very severe	Moderate	Very severe	Very severe.
AbB	Ackmen loam, 1 to 3 percent slopes	Moderate	Moderate	Slight	Slight	Very slight	Slight.
AbC	Ackmen loam, 3 to 6 percent slopes	Moderate	Moderate	Slight	Slight	Very slight	Slight.
AbD	Ackmen loam, 6 to 10 percent slopes	Moderate	Moderate	Slight	Slight	Very slight	Moderate.
AbE2	Ackmen loam, 10 to 20 percent slopes, eroded.	Moderate	Severe	Slight	Slight	Slight	Severe.
Ac	Airport silt loam	Severe	Severe	Severe	Severe	Severe	Severe.
Ad	Airport silty clay loam	Severe	Severe	Severe	Severe	Severe	Severe.
Ae	Airport soils, shallow water table	Very severe	Severe	Severe	Severe	Very severe	Very severe.
AF	Airport-Ford complex:						
	Airport soil	Severe	Severe	Severe	Severe	Severe	Severe.
	Ford soil	Severe	Severe	Moderate	Severe	Severe	Severe.

TABLE 8.—*Limitations of soils for use in community development*—Continued

Map symbol	Soil	Low building foundations	Septic tank systems	Untreated steel pipe	Concrete conduits	Landscaping	Recreation areas
AS	Arave-Saltair complex:						
	Arave soil	Severe	Severe	Severe	Severe	Very severe	Very severe.
	Saltair soil	Very severe	Very severe	Very severe	Very severe	Very severe	Very severe
BaE	Barton rocky loams, 5 to 30 percent slopes.	Moderate	Moderate to severe.	Very slight	Slight	Severe	Moderate to severe.
BrG	Barton very rocky loams, 30 to 40 percent slopes.	Very severe	Severe	Very slight	Slight	Severe	Very severe.
CaA	Chance loam, 0 to 3 percent slopes	Very severe	Severe	Moderate	Moderate	Severe	Severe.
ClA	Chance-Ironton complex, 0 to 3 percent slopes:						
	Chance soil	Very severe	Severe	Moderate	Moderate	Severe	Severe.
	Ironton soil	Very severe	Severe	Moderate	Moderate	Moderate	Moderate.
Co	Cobbly alluvial land						
Cr	Croy loam	Severe	Very severe	Severe	Severe	Very severe	Very severe.
CuA	Cudahy silt loam, 0 to 3 percent slopes	Very severe	Very severe	Moderate	Moderate	Severe	Severe.
DaA	Draper loam, 0 to 1 percent slopes	Severe	Severe	Moderate	Slight	Moderate	Moderate.
DaB	Draper loam, 1 to 3 percent slopes	Severe	Severe	Moderate	Slight	Moderate	Moderate.
DrA	Draper loam, drained, 0 to 1 percent slopes.	Moderate	Moderate	Slight	Slight	Slight	Slight.
DrB	Draper loam, drained, 1 to 3 percent slopes.	Moderate	Moderate	Slight	Slight	Slight	Slight.
DrC	Draper loam, drained, 3 to 6 percent slopes.	Moderate	Moderate	Slight	Slight	Slight	Slight.
DsB	Draper gravelly loam, gravelly subsoil variant, 1 to 3 percent slopes.	Moderate	Moderate	Slight	Slight	Slight	Slight.
DsC	Draper gravelly loam, gravelly subsoil variant, 3 to 6 percent slopes.	Moderate	Moderate	Slight	Slight	Slight	Slight.
Fa	Ford loam	Severe	Severe	Moderate	Severe	Severe	Severe.
Fb	Ford loam, shallow water table	Very severe	Very severe	Moderate	Severe	Very severe	Very severe.
FcB	Francis loamy fine sand, 0 to 3 percent slopes.	Slight	Severe	Very slight	Slight	Moderate	Moderate.
FcC	Francis loamy fine sand, 3 to 6 percent slopes.	Slight	Severe	Very slight	Slight	Moderate	Moderate.
FcD	Francis loamy fine sand, 6 to 10 percent slopes.	Slight	Severe	Very slight	Slight	Moderate	Moderate.
FcE2	Francis loamy fine sand, 10 to 20 percent slopes, eroded.	Moderate	Severe	Very slight	Slight	Severe	Severe.
FcF2	Francis loamy fine sand, 20 to 30 percent slopes, eroded.	Severe	Severe	Very slight	Slight	Severe	Severe.
FKG2	Francis-Kidman complex, 20 to 50 percent slopes, eroded:						
	Francis soil	Very severe	Very severe	Very slight	Slight	Very severe	Very severe.
	Kidman soil	Moderate	Severe	Slight	Slight	Severe	Severe.
Go	Gooch silt loam	Severe	Severe	Very severe	Moderate	Severe	Severe.
Gs	Gooch silt loam, strongly alkali	Severe	Very severe	Very severe	Severe	Very severe	Very severe.
HaA	Harrisville silt loam, 0 to 1 percent slopes	Severe	Severe	Severe	Severe	Severe	Severe.
HaB	Harrisville silt loam, 1 to 3 percent slopes	Severe	Severe	Severe	Severe	Severe	Severe.
HaC	Harrisville silt loam, 3 to 6 percent slopes	Severe	Severe	Severe	Severe	Severe	Severe.
HLA	Harrisville-Leland complex, 0 to 1 percent slopes:						
	Harrisville soil	Severe	Severe	Severe	Severe	Very severe	Severe.
	Leland soil	Very severe	Very severe	Severe	Severe	Very severe	Very severe.
HMG2	Hillfield-Marriott complex, 30 to 60 percent slopes, eroded.	Very severe	Very severe	Slight	Slight	Very severe	Very severe.
HnD2	Hillfield soils, 6 to 10 percent slopes, eroded.	Moderate	Moderate	Slight	Slight	Moderate	Moderate.
HnE2	Hillfield soils, 10 to 20 percent slopes, eroded.	Moderate	Severe	Slight	Slight	Severe	Severe.
HTF2	Hillfield-Timpanogos-Parleys complex, 20 to 30 percent slopes, eroded.	Severe	Severe	Slight	Slight	Severe	Severe.
HTG2	Hillfield-Timpanogos-Parleys complex, 30 to 60 percent slopes, eroded.	Very severe	Very severe	Slight	Slight	Very severe	Very severe.
IaA	Ironton silt loam, 0 to 1 percent slopes	Moderate	Moderate to severe.	Moderate	Moderate	Moderate	Moderate.
IaB	Ironton silt loam, 1 to 3 percent slopes	Moderate	Moderate to severe.	Moderate	Moderate	Moderate	Moderate.
IaC	Ironton silt loam, 3 to 6 percent slopes	Moderate	Moderate to severe.	Moderate	Moderate	Moderate	Moderate.

TABLE 8.—*Limitations of soils for use in community development*—Continued

Map symbol	Soil	Low building foundations	Septic tank systems	Untreated steel pipe	Concrete conduits	Landscaping	Recreation areas
IcA	Ironton silt loam, moderately alkali, 0 to 1 percent slopes.	Severe	Severe	Severe	Severe	Severe	Severe.
IDA	Ironton-Draper complex, 0 to 3 percent slopes:						
	Ironton silt loam, 1 to 3 percent slopes.	Moderate	Moderate to severe.	Moderate	Moderate	Moderate	Moderate.
	Draper loam, 0 to 1 percent slopes	Moderate	Severe	Moderate	Slight	Moderate	Moderaet.
KaA	Kidman fine sandy loam, 0 to 1 percent slopes.	Slight	Moderate	Slight	Slight	Very slight.	Very slight.
KaB	Kidman fine sandy loam, 1 to 3 percent slopes.	Slight	Moderate	Slight	Slight	Very slight.	Very slight.
KaC	Kidman fine sandy loam, 3 to 6 percent slopes.	Slight	Moderate	Slight	Slight	Very slight.	Slight.
KaD	Kidman fine sandy loam, 6 to 10 percent slopes.	Moderate	Moderate	Slight	Slight	Very slight.	Moderate.
KaE2	Kidman fine sandy loam, 10 to 20 percent slopes, eroded.	Moderate	Severe	Slight	Slight	Slight	Severe.
KbA	Kilburn sandy loam, 0 to 1 percent slopes.	Very slight.	Slight	Slight	Slight	Very slight.	Very slight.
KbB	Kilburn sandy loam, 1 to 3 percent slopes.	Very slight.	Slight	Slight	Slight	Very slight.	Very slight.
KbC	Kilburn sandy loam, 3 to 6 percent slopes.	Very slight.	Slight	Slight	Slight	Slight	Slight.
KcA	Kilburn stony sandy loam, 0 to 3 percent slopes.	Very slight.	Slight	Slight	Slight	Severe	Severe.
KFE2	Kilburn-Francis association, 10 to 20 percent slopes, eroded.	Moderate	Severe	Slight	Slight	Severe	Severe.
KFF2	Kilburn-Francis association, 20 to 30 percent slopes, eroded:						
	Kilburn soil	Severe	Severe	Slight	Slight	Severe	Severe.
	Francis soil	Severe	Severe	Very slight.	Slight	Severe	Severe.
KFG2	Kilburn-Francis association, 30 to 50 percent slopes, eroded:						
	Kilburn soil	Very severe.	Very severe.	Slight	Slight	Very severe.	Very severe.
	Francis soil	Very severe.	Very severe.	Very slight.	Slight	Very severe.	Very severe.
KgB	Kilburn gravelly sandy loam, 1 to 3 percent slopes.	Very slight.	Slight	Slight	Slight	Slight	Slight.
KgC	Kilburn gravelly sandy loam, 3 to 6 percent slopes.	Very slight.	Slight	Slight	Slight	Slight	Slight.
KgD	Kilburn gravelly sandy loam, 6 to 10 percent slopes.	Slight	Moderate	Slight	Slight	Moderate	Moderate.
KgE2	Kilburn gravelly sandy loam, 10 to 20 percent slopes, eroded.	Moderate	Severe	Slight	Slight	Severe	Severe.
KIC	Kilburn cobbly sandy loam, 3 to 10 percent slopes.	Slight	Slight to moderate.	Slight	Slight	Severe	Severe.
KIE2	Kilburn cobbly sandy loam, 10 to 20 percent slopes, eroded.	Moderate	Severe	Slight	Slight	Severe	Severe.
KmA	Kilburn gravelly sandy loam, deep over clean sands, 0 to 3 percent slopes.	Very slight.	Very severe.	Slight	Slight	Slight	Slight.
KmC	Kilburn gravelly sandy loam, deep over clean sands, 3 to 10 percent slopes.	Very slight.	Very severe.	Slight	Slight	Moderate	Moderate.
Kr	Kirkham loam	Severe	Severe	Moderate	Moderate	Moderate	Moderate.
Ks	Kirkham silty clay loam	Severe	Severe	Moderate	Moderate	Moderate	Moderate.
Kt	Kirkham silty clay loam, strongly alkali	Very severe.	Severe	Severe	Severe	Severe	Severe.
KX	Kirkham-Airport silty clay loams. (For ratings of Kirkham soils in this complex, refer to Kirkham silty clay loam, strongly alkali; for ratings of Airport soils, refer to Airport silty clay loam.)						
La	Lakeshore silt loam	Very severe.	Very severe.	Very severe.	Severe	Very severe.	Very severe.
Lb	Lakeshore fine sandy loam	Very severe.	Very severe.	Very severe.	Severe	Very severe.	Very severe.
LcB	Layton loamy fine sand, 0 to 3 percent slopes.	Slight	Moderate	Slight	Slight	Moderate	Moderate.
LcC	Layton loamy fine sand, 3 to 6 percent slopes.	Slight	Moderate	Slight	Slight	Moderate	Moderate.
LcD	Layton loamy fine sand, 6 to 10 percent slopes.	Slight	Moderate	Slight	Slight	Moderate	Moderate.
LdB	Layton loamy fine sand, duned, 1 to 3 percent slopes.	Slight	Moderate	Slight	Slight	Moderate	Moderate.

TABLE 8.—*Limitations of soils for use in community development*—Continued

Map symbol	Soil	Low building foundations	Septic tank systems	Untreated steel pipe	Concrete conduits	Landscaping	Recreation areas
Le	Leland silt loam	Very severe	Very severe	Severe	Severe	Very severe	Very severe.
LHA	Leland-Harrisville silt loams, 0 to 1 percent slopes. (For ratings of Leland soils in this complex, refer to Leland silt loam; for ratings of Harrisville soils, refer to Harrisville silt loam, 0 to 1 percent slopes.)						
LP	Leland-Airport-Croy complex. (For ratings of Leland soils in this complex, refer to Leland silt loam; for ratings of Airport soils, refer to Airport silt loam; and for ratings of Croy soils, refer to Croy loam.)						
LS	Leland-Saltair complex:						
	Leland soil	Very severe	Very severe	Severe	Severe	Very severe	Very severe.
	Saltair soil	Very severe	Very severe	Very severe	Very severe	Very severe	Very severe.
Lt	Logan silty clay loam	Very severe	Severe	Moderate	Moderate	Severe	Severe.
Lu	Logan silty clay loam, moderately alkali	Very severe	Severe	Severe	Severe	Severe	Severe.
Lw	Logan silty clay loam, shallow water table	Very severe	Severe	Moderate	Moderate	Very severe	Very severe.
Ma	Made land						
McE2	Marriott cobbly sandy loam, 10 to 30 percent slopes, eroded.	Moderate	Severe	Slight	Slight	Severe	Severe.
MgD	Marriott gravelly sandy loam, calcareous variant, 6 to 10 percent slopes.	Slight	Moderate	Slight	Slight	Moderate	Moderate.
MgE2	Marriott gravelly sandy loam, calcareous variant, 10 to 20 percent slopes, eroded.	Moderate	Severe	Slight	Slight	Moderate	Moderate.
MrA	Martini fine sandy loam, 0 to 1 percent slopes.	Moderate	Slight	Slight	Slight	Slight	Slight.
MtA	Martini fine sandy loam, 0 to 1 percent slopes, channeled.	Moderate	Slight	Slight	Slight	Slight	Slight.
PaA	Parleys loam, 0 to 1 percent slopes	Severe	Slight	Moderate	Slight	Slight	Slight.
PaB	Parleys loam, 1 to 3 percent slopes	Severe	Moderate	Slight	Slight	Slight	Slight.
PaC	Parleys loam, 3 to 6 percent slopes	Severe	Moderate	Slight	Slight	Slight	Slight.
PaD	Parleys loam, 6 to 10 percent slopes	Severe	Moderate	Slight	Slight	Moderate	Moderate.
PaE2	Parleys loam, 10 to 20 percent slopes, eroded.	Severe	Severe	Slight	Slight	Severe	Severe.
PMA	Payson-Airport silt loams, 0 to 3 percent slopes:						
	Payson soil	Very severe	Very severe	Severe	Severe	Very severe	Very severe.
	Airport soil	Severe	Severe	Severe	Severe	Severe	Severe.
PNA	Payson-Warm Springs complex, 0 to 3 percent slopes:						
	Payson soil	Very severe	Very severe	Severe	Severe	Very severe	Very severe.
	Warm Springs soil	Severe	Severe	Severe	Severe	Moderate	Moderate.
PvB	Pleasant View loam, 1 to 3 percent slopes	Moderate	Slight	Slight	Slight	Very slight	Very slight.
PvC	Pleasant View loam, 3 to 6 percent slopes	Moderate	Slight	Slight	Slight	Very slight	Slight.
PvD	Pleasant View loam, 6 to 10 percent slopes.	Moderate	Moderate	Slight	Slight	Moderate	Moderate.
PvE	Pleasant View loam, 10 to 20 percent slopes.	Moderate	Severe	Slight	Slight	Severe	Severe.
PvE2	Pleasant View loam, 10 to 20 percent slopes, eroded.	Moderate	Severe	Slight	Slight	Severe	Severe.
PwC	Pleasant View gravelly sandy loam, 3 to 6 percent slopes.	Moderate	Slight	Slight	Slight	Slight	Slight.
PwD	Pleasant View gravelly sandy loam, 6 to 10 percent slopes.	Moderate	Moderate	Slight	Slight	Moderate	Moderate.
PxB	Preston fine sand, 1 to 10 percent slopes	Slight	Severe	Very slight	Slight	Severe	Severe.
PxE	Preston fine sand, 10 to 20 percent slopes	Slight	Severe	Very slight	Slight	Severe	Severe.
PyB	Preston fine sand, duned, 1 to 10 percent slopes.	Slight	Severe	Very slight	Slight	Severe	Severe.
Ra	Refuge loam	Severe	Severe	Very severe	Very severe	Severe	Severe.
RdD	Ridd stony sandy loam, 6 to 10 percent slopes.	Slight	Moderate	Slight	Slight	Severe	Severe.
RkE2	Ridd rocky sandy loam, 10 to 30 percent slopes, eroded.	Moderate	Severe	Slight	Slight	Severe	Severe.
RkG2	Ridd rocky sandy loam, 30 to 70 percent slopes, eroded.	Very severe	Very severe	Slight	Slight	Very severe	Very severe.
Ro	Rock outcrop						
Rs	Roshe Springs silt loam	Severe	Severe	Moderate	Moderate	Severe	Severe.
Rt	Roshe Springs silt loam, deep over clay	Severe	Severe	Severe	Moderate	Severe	Severe.
Rw	Roshe Springs silt loam, shallow water table.	Very severe	Very severe	Severe	Moderate	Severe	Severe.

TABLE 8.—*Limitations of soils for use in community development*—Continued

Map symbol	Soil	Low building foundations	Septic tank systems	Untreated steel pipe	Concrete conduits	Landscaping	Recreation areas
Sa	Saltair silty clay loam	Very severe.	Very severe.	Very severe.	Very severe.	Very severe.	Very severe.
SbA	Steed fine sandy loam, 0 to 1 percent slopes.	Slight	Severe	Slight	Slight	Moderate	Moderate.
ScA	Steed fine sandy loam, 0 to 1 percent slopes, channeled.	Slight	Severe	Slight	Slight	Severe	Severe.
SdA	Steed gravelly fine sandy loam, 0 to 2 percent slopes.	Slight	Severe	Slight	Slight	Moderate	Moderate.
SeA	Steed gravelly fine sandy loam, 0 to 2 percent slopes, channeled.	Slight	Severe	Slight	Slight	Severe	Severe.
SfD	Sterling gravelly loam, 6 to 10 percent slopes.	Slight	Moderate	Slight	Slight	Moderate	Moderate.
SgE	Sterling cobbly loam, 8 to 20 percent slopes.	Moderate	Moderate to severe.	Slight	Slight	Moderate to severe.	Moderate to severe.
ShF2	Sterling very rocky loam, 6 to 50 percent slopes, eroded.	Moderate to very severe.	Severe	Slight	Slight	Very severe.	Very severe.
SkA	Sunset loam, 0 to 1 percent slopes	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate.
SkB	Sunset loam, 1 to 3 percent slopes	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate.
SmA	Sunset loam, strongly alkali, 0 to 1 percent slopes.	Severe	Moderate	Severe	Severe	Severe	Moderate.
SnA	Sunset loam, gravelly substratum, 0 to 1 percent slopes.	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate.
So	Syracuse loamy fine sand	Severe	Moderate	Moderate	Moderate	Moderate	Moderate.
Sy	Syracuse loamy fine sand, strongly alkali.	Severe	Severe	Moderate	Moderate	Severe	Severe.
Ta	Terminal loam	Very severe.	Severe	Severe	Severe	Severe	Severe.
TbA	Timpanogos loam, 0 to 1 percent slopes	Moderate	Moderate	Slight	Slight	Very slight.	Very slight.
TbB	Timpanogos loam, 1 to 3 percent slopes	Moderate	Moderate	Slight	Slight	Very slight.	Very slight.
TbC	Timpanogos loam, 3 to 6 percent slopes	Moderate	Moderate	Slight	Slight	Slight	Slight.
TbD2	Timpanogos loam, 6 to 10 percent slopes, eroded.	Moderate	Moderate	Slight	Slight	Moderate	Moderate.
TbE2	Timpanogos loam, 10 to 20 percent slopes, eroded.	Moderate	Severe	Slight	Slight	Severe	Severe.
TcD	Timpanogos very fine sandy loam, noncalcareous variant, 6 to 10 percent slopes.	Moderate	Moderate	Slight	Slight	Moderate	Moderate.
TcE	Timpanogos very fine sandy loam, noncalcareous variant, 10 to 20 percent slopes.	Moderate	Severe	Slight	Slight	Severe	Severe.
TDD	Timpanogos variant-Draper complex, 3 to 10 percent slopes. (For ratings of Timpanogos variant in this complex, refer to Timpanogos fine sandy loam, noncalcareous variant, 6 to 10 percent slopes; for ratings of Draper soils, refer to Draper loam.)						
TrB2	Trenton silt loam, 1 to 3 percent slopes, eroded.	Very severe.	Severe	Severe	Severe	Severe	Severe.
TrC3	Trenton silt loam, 3 to 10 percent slopes, severely eroded.	Very severe.	Severe	Severe	Severe	Severe	Severe.
WaA	Warm Springs fine sandy loam, 0 to 1 percent slopes.	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate.
WaB	Warm Springs fine sandy loam, 1 to 3 percent slopes.	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate.
WdA	Warm Springs fine sandy loam, deep over clay, 0 to 1 percent slopes.	Severe	Severe	Severe	Severe	Severe	Severe.
WgA	Warm Springs fine sandy loam, strongly alkali, 0 to 1 percent slopes.	Severe	Severe	Severe	Severe	Severe	Severe.
WhA	Warm Springs fine sandy loam, strongly alkali, 0 to 1 percent slopes, channeled.	Severe	Severe	Severe	Severe	Severe	Severe.
WlA	Warm Springs fine sandy loam, shallow water table, 0 to 1 percent slopes.	Severe	Severe	Severe	Severe	Severe	Severe.
Wm	Wayment silty clay loam	Very severe.	Very severe.	Very severe.	Severe	Very severe.	Very severe.
WR	Wayment-Refuge complex. (For ratings of Wayment soils in this complex, refer to Wayment silty clay loam; for ratings of Refuge soils, refer to Refuge loam.)						
Ws	Woods Cross silty clay loam	Very severe.	Severe	Moderate	Moderate	Very severe.	Very severe.
Wt	Woods Cross silty clay loam, drained	Very severe.	Severe	Moderate	Moderate	Severe	Severe.

Although the detailed soil map and the table serve as a guide for evaluating most soils, a detailed investigation is needed because as much as 15 percent of an area designated as a specific soil on the map may consist of areas of other soils too small to be shown on the published map.

If soil characteristics other than those named were known to affect the ratings, these characteristics were considered and the ratings adjusted accordingly; for example, Ford and Cudahy soils are moderately deep to a hardpan. The effect of the hardpan on use was considered.

Utah Resources Bulletin No. 27 (*20*) contains interpretive maps of that part of the survey area that is in Davis County. These maps were based on the names of soils in the field correlation at that time and were made before the national guides were issued. The ratings in these publications therefore may not be the same.

Foundations for low buildings.—For industrial and residential buildings, the selection and use of soils as foundations are determined mainly by texture, permeability, depth to the water table, bearing capacity, shear strength, and slope. The soils have been rated on the basis of the limitation that affects their use for foundations for residential and other buildings of three stories or less. The foundation of a building transmits the weight of the structure onto the natural, undisturbed soils.

The Unified soil classification system used in engineering has been used here for evaluating the bearing capacity, shrink-swell potential, and shear strength of soils for the ratings shown in table 8. Although slope does not directly affect foundations, it does affect construction and is therefore considered in these ratings. Special design and construction methods are needed for buildings on steep soils, but some of these areas have a definite esthetic value, as they occur where the view is unobstructed. The substratum of the soil usually provides the base for foundations of buildings and therefore is the material that is rated for foundations.

Septic tank systems.—The filter field is a part of the septic tank absorption system for sewage disposal. The effectiveness of the system is determined largely by the kind of soil. The main characteristics and qualities that determine the suitability of a soil for use as a filter field are texture, permeability, depth to hard rock or other restrictive layer, frequency of flooding or overflow, depth to the water table, and degree of slope.

Coarse-textured soils—loamy sand, sand, and soils that are gravelly—have very rapid permeability and have relatively poor filtering qualities. These soils allow unfiltered sewage to travel long distances and therefore have moderate to high limitations for septic tank systems. Soils that have moderate to very rapid permeability are rated slight. Soils that have permeability near the slower end of the moderate range (about 1 to 0.63 inch per hour) are rated moderate. Soils that have permeability of 0.63 to 0.063 inch per hour are rated high. The water table should be at least 4 feet below the surface. Well drained and moderately well drained soils that have a water table below a depth of 48 inches are rated slight. Somewhat poorly drained and moderately well drained soils that have a water table above a depth of 48 inches are rated moderate. Poorly drained and very poorly drained soils that have a shallow water table are rated severe. Soils that have bedrock or an indurated hardpan within a depth of 40 inches are rated moderate to very high. Soils that are occasionally flooded are rated severe. Soils that have slopes of less than 10 percent are the most desirable because mechanical difficulties of layout and construction increase with increasing steepness.

Structural materials of metal or concrete, corrode when buried in soil, and some materials corrode more rapidly in some soils than in others. Corrosivity correlates closely with the physical, chemical, and biological characteristics and qualities of soils. The rate of corrosion varies with the drainage, permeability, acidity, and resistivity of the soil.

Untreated steel pipe.—The corrosivity of soil material for untreated steel pipe is commonly determined by (1) electrical resistivity, or resistence to the flow of electric current, (2) acidity, (3) drainage, and (4) texture (*11*).

Concrete conduits.—Concrete conduits placed in soil material deteriorate at varying rates. The rate depends on (1) the texture and acidity of the soil material, (2) content of sodium sulfate or magnesium sulfate, and (3) content of sodium chloride.

Landscaping.—The ratings of the soils for landscaping are based mainly on the use of the soil for lawns, shrubs, and ornamental trees. Ratings of soils for topsoil are given in table 5 of the engineering section. The soil characteristics that influence uses for landscaping are texture, content of coarse fragments, permeability, depth to the water table, content of salt and alkali, and slope.

Recreational areas.—The ratings for recreational areas are based on the use of the soil for cottages, utility buildings, campsites, picnic areas, golf fairways, or play areas. The relative ratings are based only on characteristics and qualities of the other soils; other factors that affect recreational areas have not been evaluated. Where the limitations are most restrictive for one use over the others, those limitations have been used to rate the soil. The main qualities and characteristics considered in rating soils for recreational areas are texture, drainage, depth to the water table, degree of slope, content of salts and alkali, and stoniness.

Descriptions of the Soils

This section describes the soils series, which are groups of similar soils, and the single soils, or mapping units, of the Davis-Weber Area. The acreage and proportionate extent of each mapping unit are given in table 9.

The procedure in this section is first to describe the soil series and then the mapping units in that series. Thus to get full information on any one mapping unit, it is necessary to read the description of that unit and also the description of the soil series to which it belongs. Unless otherwise stated, the description of all mapping units in this section is for moist soil. As mentioned in the section "How This Survey Was Made," not all mapping units are members of a soil series. Made land and Rock outcrop are miscellaneous land types and do not belong to a soil series; nevertheless, they are listed in alphabetic order along with the series.

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TABLE 9.—*Approximate acreage and proportionate extent of the soils*

Map symbol	Soil	Area	Extent	Map symbol	Soil	Area	Extent
		Acres	*Percent*			*Acres*	*Percent*
Aa	Abbott clay	200	0. 1	IaC	Ironton silt loam, 3 to 6 percent slopes	188	0. 1
AbB	Ackmen loam, 1 to 3 percent slopes	883	. 4	IcA	Ironton silt loam, moderately alkali, 0 to 1 percent slopes	414	. 2
AbC	Ackmen loam, 3 to 6 percent slopes	1, 029	. 5	IDA	Ironton-Draper complex, 0 to 3 percent slopes	879	. 4
AbD	Ackmen loam, 6 to 10 percent slopes	479	. 2	KaA	Kidman fine sandy loam, 0 to 1 percent slopes	12, 150	5. 5
AbE2	Ackmen loam, 10 to 20 percent slopes, eroded	209	. 1	KaB	Kidman fine sandy loam, 1 to 3 percent slopes	6, 625	3. 0
Ac	Airport silt loam	1, 770	. 8	KaC	Kidman fine sandy loam, 3 to 6 percent slopes	899	. 4
Ad	Airport silty clay loam	512	. 2	KaD	Kidman fine sandy loam, 6 to 10 percent slopes	410	. 2
Ae	Airport soils, shallow water table	267	. 1	KaE2	Kidman fine sandy loam, 10 to 20 percent slopes, eroded	307	. 1
AF	Airport-Ford complex	491	. 2	KbA	Kilburn sandy loam, 0 to 1 percent slopes	876	. 4
AS	Arave-Saltair complex	7, 068	3. 2	KbB	Kilburn sandy loam, 1 to 3 percent slopes	79	(1)
BaE	Barton rocky loams, 5 to 30 percent slopes	437	. 2	KbC	Kilburn sandy loam, 3 to 6 percent slopes	89	(1)
BrG	Barton very rocky loams, 30 to 40 percent slopes	1, 104	. 5	KcA	Kilburn stony sandy loam, 0 to 3 percent slopes	264	. 1
CaA	Chance loam, 0 to 3 percent slopes	171	. 1	KFE2	Kilburn-Francis association, 10 to 20 percent slopes, eroded	95	(1)
CIA	Chance-Ironton complex, 0 to 3 percent slopes	50	(1)	KFF2	Kilburn-Francis association, 20 to 30 percent slopes, eroded	539	. 2
Co	Cobbly alluvial land	417	. 2	KFG2	Kilburn-Francis association, 30 to 50 percent slopes, eroded	6, 185	2. 8
Cr	Croy loam	883	. 4	KgB	Kilburn gravelly sandy loam, 1 to 3 percent slopes	289	. 1
CuA	Cudahy silt loam, 0 to 3 percent slopes	660	. 3	KgC	Kilburn gravelly sandy loam, 3 to 6 percent slopes	822	. 4
DaA	Draper loam, 0 to 1 percent slopes	200	. 1	KgD	Kilburn gravelly sandy loam, 6 to 10 percent slopes	1, 774	. 8
DaB	Draper loam, 1 to 3 percent slopes	244	. 1	KgE2	Kilburn gravelly sandy loam, 10 to 20 percent slopes, eroded	1, 550	. 7
DrA	Draper loam, drained, 0 to 1 percent slopes	885	. 4	KIC	Kilburn cobbly sandy loam, 3 to 10 percent slopes	1, 028	. 5
DrB	Draper loam, drained, 1 to 3 percent slopes	1, 325	. 6	KIE2	Kilburn cobbly sandy loam, 10 to 20 percent slopes, eroded	2, 210	1. 0
DrC	Draper loam, drained, 3 to 6 percent slopes	435	. 2	KmA	Kilburn gravelly sandy loam, deep over clean sands, 0 to 3 percent slopes	2, 172	1. 0
DsB	Draper gravelly loam, gravelly subsoil variant, 1 to 3 percent slopes	116	. 1	KmC	Kilburn gravelly sandy loam, deep over clean sands, 3 to 10 percent slopes	248	. 1
DsC	Draper gravelly loam, gravelly subsoil variant, 3 to 6 percent slopes	233	. 1	Kr	Kirkham loam	204	. 1
Fa	Ford loam	2, 210	1. 0	Ks	Kirkham silty clay loam	886	. 4
Fb	Ford loam, shallow water table	883	. 4	Kt	Kirkham silty clay loam, strongly alkali	765	. 3
FcB	Francis loamy fine sand, 0 to 3 percent slopes	652	. 3	KX	Kirkham-Airport silty clay loams	589	. 3
FcC	Francis loamy fine sand, 3 to 6 percent slopes	615	. 3	La	Lakeshore silt loam	3, 350	1. 5
FcD	Francis loamy fine sand, 6 to 10 percent slopes	850	. 4	Lb	Lakeshore fine sandy loam	4, 650	2. 1
FcE2	Francis loamy fine sand, 10 to 20 percent slopes, eroded	888	. 4	LcB	Layton loamy fine sand, 0 to 3 percent slopes	5, 525	2. 5
FcF2	Francis loamy fine sand, 20 to 30 percent slopes, eroded	73	(1)	LcC	Layton loamy fine sand, 3 to 6 percent slopes	425	. 2
FKG2	Francis-Kidman complex, 20 to 50 percent slopes, eroded	689	. 3	LcD	Layton loamy fine sand, 6 to 10 percent slopes	92	(1)
Go	Gooch silt loam	718	. 3	LdB	Layton loamy fine sand, duned, 1 to 3 percent slopes	212	. 1
Gs	Gooch silt loam, strongly alkali	800	. 4	Le	Leland silt loam	3, 850	1. 7
HaA	Harrisville silt loam, 0 to 1 percent slopes	1, 082	. 5	LHA	Leland-Harrisville silt loams, 0 to 1 percent slopes	1, 350	. 6
HaB	Harrisville silt loam, 1 to 3 percent slopes	880	. 4	LP	Leland-Airport-Croy complex	329	. 2
HaC	Harrisville silt loam, 3 to 6 percent slopes	118	. 1	LS	Leland-Saltair complex	1, 640	. 7
HLA	Harrisville-Leland complex, 0 to 1 percent slopes	1, 101	. 5	Lt	Logan silty clay loam	2, 250	1. 0
HMG2	Hillfield-Marriott complex, 30 to 60 percent slopes, eroded	496	. 2	Lu	Logan silty clay loam, moderately alkali	1, 110	. 5
HnD2	Hillfield soils, 6 to 10 percent slopes, eroded	139	. 1				
HnE2	Hillfield soils, 10 to 20 percent slopes, eroded	428	. 2				
HTF2	Hillfield-Timpanogos-Parleys complex, 20 to 30 percent slopes, eroded	741	. 3				
HTG2	Hillfield-Timpanogos-Parleys complex, 30 to 60 percent slopes, eroded	1, 325	. 6				
IaA	Ironton silt loam, 0 to 1 percent slopes	3, 100	1. 4				
IaB	Ironton silt loam, 1 to 3 percent slopes	661	. 4				

See footnote at end of table.

TABLE 9.—*Approximate acreage and proportionate extent of the soils*—Continued

Map symbol	Soil	Area	Extent	Map symbol	Soil	Area	Extent
		Acres	*Percent*			*Acres*	*Percent*
Lw	Logan silty clay loam, shallow water table	543	0. 2	SdA	Steed gravelly fine sandy loam, 0 to 2 percent slopes	484	0. 2
Ma	Made land	225	. 1	SeA	Steed gravelly fine sandy loam, 0 to 2 percent slopes, channeled	414	. 2
McE2	Marriott cobbly sandy loam, 10 to 30 percent slopes, eroded	132	. 1	SfD	Sterling gravelly loam, 6 to 10 percent slopes	269	. 1
MgD	Marriott gravelly sandy loam, calcareous variant, 6 to 10 percent slopes	442	. 2	SgE	Sterling cobbly loam, 8 to 20 percent slopes	467	. 2
MgE2	Marriott gravelly sandy loam, calcareous variant, 10 to 20 percent slopes, eroded	242	. 1	ShF2	Sterling very rocky loam, 6 to 50 percent slopes, eroded	583	. 3
MrA	Martini fine sandy loam, 0 to 1 percent slopes	717	. 3	SkA	Sunset loam, 0 to 1 percent slopes	5, 740	2. 6
MtA	Martini fine sandy loam, 0 to 1 percent slopes, channeled	345	. 2	SkB	Sunset loam, 1 to 3 percent slopes	362	. 2
PaA	Parleys loam, 0 to 1 percent slopes	5, 340	2. 4	SmA	Sunset loam, strongly alkali, 0 to 1 percent slopes	630	. 3
PaB	Parleys loam, 1 to 3 percent slopes	5, 760	2. 6	SnA	Sunset loam, gravelly substratum, 0 to 1 percent slopes	732	. 3
PaC	Parleys loam, 3 to 6 percent slopes	1, 770	. 8	So	Syracuse loamy fine sand	6, 184	2. 8
PaD	Parleys loam, 6 to 10 percent slopes	956	. 4	Sy	Syracuse loamy fine sand, strongly alkali	1, 638	. 7
PaE2	Parleys loam, 10 to 20 percent slopes, eroded	564	. 3	Ta	Terminal loam	280	. 1
PMA	Payson-Airport silt loams, 0 to 3 percent slopes	1, 550	. 7	TbA	Timpanogos loam, 0 to 1 percent slopes	2, 875	1. 3
PNA	Payson-Warm Springs complex, 0 to 3 percent slopes	2, 210	1. 0	TbB	Timpanogos loam, 1 to 3 percent slopes	1, 987	. 9
PvB	Pleasant View loam, 1 to 3 percent slopes	461	. 2	TbC	Timpanogos loam, 3 to 6 percent slopes	1, 104	. 5
PvC	Pleasant View loam, 3 to 6 percent slopes	249	. 1	TbD2	Timpanogos loam, 6 to 10 percent slopes, eroded	423	. 2
PvD	Pleasant View loam, 6 to 10 percent slopes	376	. 2	TbE2	Timpanogos loam, 10 to 20 percent slopes, eroded	440	. 2
PvE	Pleasant View loam, 10 to 20 percent slopes	151	. 1	TcD	Timpanogos very fine sandy loam, noncalcareous variant, 6 to 10 percent slopes	100	(1)
PvE2	Pleasant View loam, 10 to 20 percent slopes, eroded	222	. 1	TcE	Timpanogos very fine sandy loam, noncalcareous variant, 10 to 20 percent slopes	61	(1)
PwC	Pleasant View gravelly sandy loam, 3 to 6 percent slopes	153	. 1	TDD	Timpanogos variant-Draper complex, 3 to 10 percent slopes	173	. 1
PwD	Pleasant View gravelly sandy loam, 6 to 10 percent slopes	104	(1)	TrB2	Trenton silt loam, 1 to 3 percent slopes, eroded	278	. 1
PxB	Preston fine sand, 1 to 10 percent slopes	2, 430	1. 1	TrC3	Trenton silt loam, 3 to 10 percent slopes, severely eroded	52	(1)
PxE	Preston fine sand, 10 to 20 percent slopes	372	. 2	WaA	Warm Springs fine sandy loam, 0 to 1 percent slopes	9, 350	4. 2
PyB	Preston fine sand, duned, 1 to 10 percent slopes	1, 990	. 9	WaB	Warm Springs fine sandy loam, 1 to 3 percent slopes	650	. 3
Ra	Refuge loam	3, 090	1. 4	WdA	Warm Springs fine sandy loam, deep over clay, 0 to 1 percent slopes	217	. 1
RdD	idd stony sandy loam, 6 to 10 percent slopes	129	. 1	WgA	Warm Springs fine sandy loam, strongly alkali, 0 to 1 percent slopes	8, 850	4. 0
RkE2	Ridd rocky sandy loam, 10 to 30 percent slopes, eroded	609	. 3	WhA	Warm Springs fine sandy loam, strongly alkali, 0 to 1 percent slopes, channeled	2, 430	1. 1
RkG2	Ridd rocky sandy loam, 30 to 70 percent slopes, eroded	7, 380	3. 3	WlA	Warm Springs fine sandy loam, shallow water table, 0 to 1 percent slopes	78	(1)
Ro	Rock outcrop	1, 550	. 7	Wm	Wayment silty clay loam	5, 530	2. 5
Rs	Roshe Springs silt loam	485	. 2	WR	Wayment-Refuge complex	8, 180	3. 7
Rt	Roshe Springs silt loam, deep over clay	331	. 2	Ws	Woods Cross silty clay loam	414	. 2
Rw	Roshe Springs silt loam, shallow water table	480	. 2	Wt	Woods Cross silty clay loam, drained	996	. 5
Sa	Saltair silty clay loam	8, 840	4. 0		Other miscellaneous, water, etc	1, 265	. 6
SbA	Steed fine sandy loam, 0 to 1 percent slopes	461	. 2		Total	220, 869	99. 0
ScA	Steed fine sandy loam, 0 to 1 percent slopes, channeled	880	. 4				

[1] Less than 0.05 percent.

Following the name of each mapping unit, there is a symbol in parentheses. This symbol identifies the mapping unit on the detailed soil map. Listed at the end of each description of a mapping unit are the capability unit and range site in which the mapping unit has been placed. The pages on which each capability unit and range site is described can be found by referring to the "Guide to Mapping Units" at the back of this survey.

Soil scientists, engineers, students, and others interested in detailed descriptions of the soils should turn to the section "Formation, Morphology, and Classification of Soils." Many terms used in the soil descriptions and other sections are defined in the Glossary and the "Soil Survey Manual" (*16*).

Abbott Series

Ahe Abbott series consists of deep, poorly drained, fine-textured soils that are in nearly level depressions. These soils formed on low lake terraces in fine-textured sediments. Elevations range from about 4,225 to 4,300 feet above sea level.

The surface layer is gray, very firm clay 2 to 7 inches thick. The subsoil extends to an average depth of about 35 inches and consists of gray, very firm clay or silty clay. The substratum is light gray and is friable sandy clay loam in the upper part and very friable loamy very fine sand in the lower part.

Abbott soils occur near the Warm Springs, Croy, and Airport soils. The native vegetation is mainly saltgrass, some sedges, and wiregrass. Abbott soils are of limited extent and are used only for range.

Abbott clay (Aa).—This soil occurs in depressions on nearly level lake terraces. Slopes are generally less than 1 percent.

A representative profile:

0 to 6 inches, gray clay; very firm; massive; strongly calcareous; strongly alkaline.
6 to 27 inches, gray clay; very firm; massive; strongly calcareous; strongly alkaline.
27 to 46 inches, light-gray sandy clay loam; friable; massive; strongly calcareous; moderately alkaline.
46 to 61 inches, light-gray loamy very fine sand; very friable; massive; moderately calcareous; moderately alkaline.

The surface layer ranges from about 2 to 7 inches in thickness. Depth to the water table generally ranges from about 8 to 24 inches, but some areas are ponded at times. The effect of salts and alkali is moderate to strong.

Included with this soil in mapping were areas of silty clay. This poorly drained soil is slowly or very slowly permeable. Runoff is very slow or ponded, and the hazard of erosion is slight.

All of this soil is used as range. It is not suited to cultivated crops. (Capability unit VIIw–1; Salt Meadow range site)

Ackmen Series

The Ackmen series consists of deep, well-drained, medium-textured soils of the uplands. These soils formed in noncalcareous to slightly calcareous alluvium that was derived from gneiss, schist, granite, and quartzite. They are widely distributed along the base of the Wasatch Mountains on nearly level to moderately steep alluvial fans and in drainageways of intermittent streams on high lake terraces. Elevations range from 4,400 to 5,300 feet above sea level.

The surface layer is very dark brown or very dark grayish-brown, friable loam that has fine granular structure and ranges from 5 to 18 inches in thickness. The subsoil and substratum are similar to the surface layer but become somewhat lighter in color as depth increases. The deeper layers are stratified.

Ackmen soils are commonly near the Kilburn, Timpanogos, and Parleys soils. The native vegetation consisted mainly of brushy Gambel oaks, bunch grasses, and sagebrush.

The Ackmen soils are used mainly for irrigated crops and orchards. The steeper areas are used for range.

Ackmen loam, 1 to 3 percent slopes (AbB).—This soil occurs mainly on the gently sloping, lower part of alluvial fans. It occurs mainly with Kilburn gravelly sandy loam.

A representative profile:

0 to 6 inches, very dark brown loam; friable; granular structure; neutral.
6 to 32 inches, very dark brown loam; friable; prismatic and fine granular structure; neutral.
32 to 60 inches, dark-brown loam; friable; massive; noncalcareous; mildly alkaline.

The surface layer ranges from about 10 to 16 inches in thickness. In places the substratum below a depth of 36 inches ranges from loam to gravelly loam or sandy loam. Also, some fine gravel occurs throughout the profile in places.

Included with this soil in mapping were areas of fine sandy loam and small areas of gravelly sandy loam. Also included were small areas with slopes of less than 1 percent. In a few small areas the soil is deep to the water table.

This soil absorbs moisture readily, is well drained, and has moderate permeability. It holds about 2 inches of available water per foot, or about 10 inches to a depth of 5 feet. Roots penetrate to a depth of 5 feet or more. Natural fertility is high. Runoff is slow, and the hazard of erosion is slight. This soil is friable and easy to work.

This soil is used mainly for irrigated crops, for which it is well suited. The principal crops are alfalfa, small grains, sugarbeets, tomatoes, corn, apricots, peaches, and cherries. Important management practices are leveling to a uniform grade and distributing irrigation water evenly. (Capability unit IIe–2; not used for range)

Ackmen loam, 3 to 6 percent slopes (AbC).—This soil occurs on moderately sloping alluvial fans, mainly near the base of the Wasatch Mountains. Except that it is gently undulating, it is similar to Ackmen loam, 1 to 3 percent slopes. It occurs with other Ackmen soils and with Timpanogos soils. The surface layer generally ranges from about 8 to 14 inches in thickness, but recent deposition has increased this thickness in a few small spots. In places fine gravel occurs throughout the profile.

Included with this soil in mapping were areas that have a surface layer ranging from very fine sandy loam to heavy sandy loam, a few areas of gravelly sandy loam, and small areas that have slopes of less than 3 percent. Also included were small areas that have a water table below a depth of 36 inches and small areas that are moderately eroded.

Runoff is medium, and the hazard of erosion is moderate.

Almost all of this soil is used for irrigated crops. Well-suited crops are cherries, peaches, apricots, alfalfa, and small grains. Hay crops and improved pastures are also well suited. (Capability unit IIIe–2; not used for range)

Ackmen loam, 6 to 10 percent slopes (AbD).—This moderately extensive soil occurs on the upper part of strongly sloping alluvial fans where generally it is associated with Timpanogos and Parleys soils. Except for its slopes of 6 to 10 percent, it is similar to Ackmen loam, 1 to 3 percent slopes. In most places the surface layer is about 6 to 12 inches thick, but it has been thickened in small areas by recent deposition. Below a depth of 36 inches, the substratum ranges from loam to gravelly or cobbly loamy fine sand. In places a small amount of gravel occurs throughout the profile.

Included with this soil in mapping were some areas that have a brighter colored subsoil and substratum and a few areas that are moderately eroded. Also included were small areas with slopes of less than 6 percent, areas of gravelly sandy loam, and areas that have a fine sandy loam to heavy sandy loam surface layer.

Runoff is medium to rapid, and the hazard of erosion is moderate to high.

This soil is used mainly for range and for cultivated crops. Most of the cultivated areas are irrigated, but some areas are dryfarmed. Also grown and well suited are cherries, peaches, apricots, and pasture plants. Control of erosion is the principal concern of management. (Capability unit IIIe–3; Upland Loam range site)

Ackmen loam, 10 to 20 percent slopes, eroded (AbE2).—This soil occurs on moderately steep alluvial fans near the base of the Wasatch Mountains where it is associated with the other Ackmen soils and Timpanogos and Parleys soils. Except that it is steeper and moderately eroded, it is similar to Ackmen loam, 1 to 3 percent slopes. The surface layer is most commonly 5 to 9 inches thick but ranges from 6 to 16 inches in thickness. Texture of the surface layer ranges from very fine sandy loam to loam to heavy fine sandy loam. In places, the substratum below a depth of 36 inches is gravelly and cobbly. In some areas, a small amount of gravel occurs throughout the profile.

Included with this soil in mapping were a few areas of loam that are deep over pebbles and cobbles, a few small areas of gravelly sandy loam, and a few areas that have a very fine sandy loam to heavy fine sandy loam surface layer.

This soil is well drained. It holds about 9 to 10 inches of available water to a depth of 5 feet. Runoff in most places is medium but is rapid in the steeper areas. The hazard of erosion is high.

Most of this soil is used as range. It is suited to improved pasture and to orchards of cherries, peaches, or apricots. Sprinkler irrigation is better than other methods because it permits efficient use of irrigation water and is less likely to cause erosion. (Capability unit IVe–4; Upland Loam range site)

Airport Series

The Airport series consists of deep, somewhat poorly drained and poorly drained soils that are slightly to moderately affected by salts and alkali. These soils formed in moderately fine textured, mixed lake sediments on low lake terraces that are nearly level and gently sloping. Elevations range from about 4,200 to 4,300 feet above sea level.

The surface layer is very dark gray or very dark grayish-brown, friable silt loam or silty clay loam ranging from 7 to 12 inches in thickness. The subsoil is silty clay loam and ranges from very dark gray to olive brown. It is firm and very firm and dominantly of prismatic and blocky structure. The substratum begins at an average depth of 32 inches and generally ranges from silt loam to silty clay. In places it contains layers of sandy loam.

Airport soils are near the Payson, Warm Springs, Ford, Leland, Croy, and Kirkham soils. The native vegetation consisted mainly of saltgrass and alkali sacaton and some greasewood, pickleweed, and samphire.

Airport soils are used mainly for unimproved pasture. Local areas that have been drained and reclaimed from damage by salts and alkali are used for irrigated crops.

Airport silty clay loam (Ad).—This nearly level soil is on low lake terraces, mainly in association with Warm Springs fine sandy loam and other Airport soils. Slopes are generally less than 1 percent.

A representative profile:

0 to 6 inches, very dark gray silty clay loam; friable; subangular blocky structure; strongly calcareous; moderately alkaline.
6 to 19 inches, very dark gray silty clay loam; firm; prismatic structure; strongly calcareous; strongly alkaline.
19 to 32 inches, olive-gray silty clay loam; firm; blocky structure; strongly calcareous; strongly alkaline.
32 to 60 inches, olive-gray or brown silty clay loam; firm; massive or weak subangular blocky structure; faint mottles in lower 20 inches; strongly calcareous; strongly alkaline.

The surface layer ranges from about 3 to 9 inches in thickness. In most places this layer is slightly to moderately affected by salts and alkali. The subsoil and substratum are moderately affected by alkali. The water table is generally at a depth of 30 to 48 inches.

Included with this soil in mapping were small areas of slickspots that are strongly affected by salts and alkali. Also included were areas of fine sandy loam.

This soil is somewhat poorly drained and slowly or very slowly permeable. It holds about 1.8 to 2 inches of available water per foot of soil, or about 9 to 10 inches to a depth of 5 feet. Roots penetrate to a depth of 5 to 6 feet or more, but few roots are found in the very slowly permeable part of the subsoil. Natural fertility is moderate. Runoff is slow, and the hazard of erosion is none to slight. This soil is moderately difficult to till.

Most of this soil is used as range, and about 30 percent of the acreage is irrigated. Tile drains or open drains are used in some areas. Alfalfa, corn, and small grains are the principal cultivated crops. If drained and reclaimed from salts and alkali, this soil is suited to irrigated improved pasture alternated with corn or small grains. (Capability unit IVw–3; Alkali Bottom range site)

Airport silt loam (Ac).—This nearly level soil occurs at slightly higher positions on the low lake terraces than does Airport silty clay loam. It is similar to Airport silty clay loam but has a silt loam surface layer and a slightly

coarser textured subsoil and substratum. The surface layer ranges from 5 to 10 inches in thickness. Below the surface layer, permeability is slow to moderate.

Included with this soil in mapping were small areas of silty clay loam.

About one-third of the acreage is used for crops, and the rest is used for unimproved pasture. Where drained and reclaimed from salts and alkali, this soil is suited to corn, small grains, alfalfa, and improved pasture. Reclamation is easier on this soil than on Airport silty clay loam, and yields are slightly higher. This soil is moderately easy to till. (Capability unit IIIw–4; Alkali Bottom range site)

Airport soils, shallow water table (Ae).—These soils occur on nearly level low terraces adjacent to the lake plain. The areas are depressional and are slightly undulating, smooth, or slightly concave. The mapping unit consists of Airport silt loam and Airport silty clay loam that are in about equal amounts but that are so intermingled that they cannot be shown separately on a publishable map.

The surface layer ranges from 7 to 12 inches in thickness and is thicker than that of the Airport silt loam or the Airport silty clay loam where they are mapped as single units.

Included in the mapping were small areas of fine sandy loam that have a water table near the surface.

Airport soils, shallow water table, are poorly drained. Their water table is at the surface part of the time. Runoff is very slow or ponded, and the hazard of erosion is not more than slight.

The soils in this mapping unit are used for unimproved pasture, for which they are suited. Drainage and reclamation are very difficult because the soils are depressional, and drainage outlets are not adequate. (Capability unit VIIw–1; Salt Meadow range site)

Airport-Ford complex (AF).—This complex occurs on undulating low lake terraces. About 60 percent of the complex is Airport silt loam, and 40 percent is Ford loam. The Ford loam is slightly higher than the Airport silt loam and is in small, irregularly shaped areas intermingled with areas of Airport silt loam. Slopes are generally about 1 percent. Both Airport silt loam and Ford loam are described in their respective series. Also in this complex are small areas of fine sandy loam and some areas that have slopes of more than 1 percent.

The soils of this complex are somewhat poorly drained; their water table is at a depth of about 24 to 48 inches. Runoff is slow or very slow, and the hazard of erosion is slight.

These soils are used only for unimproved pasture. Drained and reclaimed areas could be used for irrigated improved pasture and for an occasional crop of a small grain or corn. (Airport silt loam is in capability unit IIIw–4; Ford loam is in capability unit IVw–3; both soils are in Alkali Bottom range site)

Arave Series

The Arave series consists of deep, poorly drained soils that are moderately to strongly affected by salts and alkali. These soils occur on nearly level low lake plains and on low lake terraces in the western part of the survey area. They formed in moderately fine textured mixed lake sediments. Elevations range from 4,205 to 4,220 feet above sea level.

The surface layer is dark grayish-brown or grayish-brown, friable silt loam about 6 to 10 inches thick. The subsoil is light olive-brown, firm loam, silty clay loam, or clay loam that has prismatic structure. The substratum is light olive-brown silty clay loam or silt loam that is firm, mottled, and massive.

The Arave soils are near the Saltair soils and, in a few places, are near the Warm Springs soils. The native vegetation consisted mostly of saltgrass and some greasewood, pickleweed, cheatgrass brome, foxtail barley, and wiregrass.

Arave soils are used only as range.

Arave-Saltair complex (AS).—Arave silt loam makes up about 75 percent of this complex, and Saltair silty clay loam makes up the rest. The Arave silt loam is slightly undulating and has slopes of less than 1 percent. It is on somewhat convex ridges and is slightly higher than the Saltair silty clay loam, which is in slight depressions on low terraces or on smooth lake plains. It is similar to Saltair silty clay loam that is described under the Saltair series. Saltair soils are generally in irregularly shaped areas of 10 acres or less.

A representative profile of Arave silt loam:

0 to 8 inches, dark grayish-brown silt loam; friable; platy structure; slightly calcareous; strongly alkaline.
8 to 18 inches, light olive-brown loam to clay loam; firm; prismatic structure; strongly calcareous; strongly alkaline.
18 to 60 inches, light-olive-brown silty clay loam or silt loam; firm; massive; common distinct mottles; strongly calcareous; strongly alkaline.

The surface layer ranges from about 6 to 10 inches in thickness and is silty clay loam in places. This layer is moderately to strongly affected by alkali.

Included with this complex in mapping was a small bar of oolitic sand about 2 miles south and 2½ miles west of Syracuse. Also included were small areas of fine sandy loam and some areas that have a lime-cemented hardpan.

The Arave soil in this complex is poorly drained and has slow or moderately slow permeability. The water table is generally between a depth of 24 and 36 inches. This soil holds about 1.8 to 2 inches of available water per foot of soil, or about 9 inches to a depth of 5 feet. Roots penetrate to the water table. Natural fertility is low. Runoff is slow, and the hazard of erosion is none to slight.

The soils of this complex are used as range. (Arave soil is in capability unit VIIw–1 and Salt Meadow range site; Saltair soil is in capability unit VIIIw–1 but is not suited to range)

Barton Series

The Barton series consists of well-drained, medium-textured, gravelly, stony, and cobbly soils on strongly sloping to steep hillsides. These soils formed in local alluvium and residuum that were derived from massive tillite. Elevations range from 4,220 to 4,700 feet above sea level. The Barton soils occur only in an area of low hills bordering Great Salt Lake in the northwestern part of the survey area. The native vegetation consisted mainly of Sandberg bluegrass, three-awn, and sagebrush.

The surface layer is very dark grayish-brown, friable, gravelly, cobbly, or stony loam that ranges from about 6 to 16 inches in thickness. The subsoil is also very dark grayish brown and friable, but in most places it contains more pebbles, cobbles, and stones than the surface layer. The substratum is very cobbly or very stony loam or sandy loam.

The soils in this series are used mainly for range that is grazed in spring and in fall.

Barton rocky loams, 5 to 30 percent slopes (BaE).—These soils occur on the rolling foothills in the Little Mountain area in the western part of Weber County. About 45 percent is gravelly loam, 45 percent is stony loam, and about 10 percent is Rock outcrop. These areas are so intermingled that they cannot be shown separately on a publishable map.

A representative profile of Barton gravelly loam:

0 to 13 inches, very dark grayish-brown gravelly loam; friable; granular structure; neutral.
13 to 19 inches, very dark grayish-brown gravelly loam; friable; subangular blocky structure; neutral.
19 to 31 inches, dark grayish-brown, very cobbly loam; friable; massive; neutral.
31 inches +, very cobbly sandy loam.

The surface layer ranges from 8 to 16 inches in thickness. About 20 to 50 percent of its volume is pebbles and cobbles. About 3 percent of the surface of the stony loam is covered by stones; otherwise, the stony loam is similar to the gravelly loam.

Included with these soils in mapping were areas of gravelly sandy loam. Also included were some areas of Rock outcrop.

These soils are well drained and have moderate and moderately rapid permeability. They hold about 1.2 inches of available water per foot, or about 6 inches to a depth of 5 feet. Roots penetrate deeply, and natural fertility is moderate to moderately low. Runoff is medium, and the hazard of erosion is moderate.

These soils are used mainly for range that is grazed in spring, but some areas are used for industrial developments. (Capability unit VIs–1; Upland Stony Loam range site)

Barton very rocky loams, 30 to 40 percent slopes (BrG).—These soils occur at slightly higher elevations than Barton rocky loams, 5 to 30 percent slopes. They are similar to those soils but are steeper and slightly more stony and cobbly throughout their profile. The surface soil ranges from about 6 to 10 inches in thickness.

Included in the mapping were areas of Rock outcrop that cover 15 to 20 percent of the surface.

These soils have rapid permeability. Runoff is medium to rapid, and the hazard of erosion is high.

These soils are used for range that is grazed in spring. (Capability unit VIIs–1; Upland Stony Loam range site)

Chance Series

The Chance series consists of deep, black, poorly drained soils in depressions of low lake terraces and flood plains where the water table is high. These nearly level to gently sloping soils formed in moderately coarse textured alluvium and reworked lake sediments that dominantly were derived from gneiss, schist, and granite. Elevations range from 4,220 to 4,500 feet above sea level.

The surface layer is black, friable loam that ranges from about 8 to 16 inches in thickness. The subsoil is very dark gray, firm, subangular blocky silt loam. In most places the substratum is stratified and ranges from loamy fine sand to silt loam. The water table of these soils is within 30 inches of the surface, and mottling is distinct.

Chance soils are commonly near the Draper, Woods Cross, Ironton, and Roshe Springs soils. The vegetation is wiregrass, sedges, Kentucky bluegrass, and saltgrass.

Chance soils are used for native pasture and hay.

Chance loam, 0 to 3 percent slopes (CaA).—This soil occurs in slight depressions on low lake terraces, mainly about 1 mile west of Farmington. Slopes are dominantly less than 1 percent and are smooth or slightly undulating.

A representative profile:

0 to 8 inches, black loam; friable; granular or subangular blocky structure; moderately calcareous; mildly alkaline.
8 to 19 inches, very dark gray silt loam; firm; subangular blocky structure; noncalcareous; mildly alkaline.
19 to 57 inches, grayish-brown loamy fine sand; very friable; massive; distinct mottles; noncalcareous or slightly calcareous; moderately alkaline.
57 to 72 inches, gray fine sandy loam; very friable; massive; distinct mottles; slightly calcareous; moderately alkaline.

The surface layer normally is noncalcareous, but in places it is moderately calcareous as a result of flooding by limy water. Depth to the water table, which fluctuates seasonally, ranges from about 1 inch to 20 inches.

Included with this soil in mapping were small areas that are permanently ponded.

This soil is poorly drained and has moderate permeability. It holds about 2 inches of available water per foot, or about 10 inches to a depth of 5 feet. Roots penetrate to a depth of 5 feet or more. Natural fertility is high. Runoff is slow, and the hazard of erosion is not more than slight. This soil is friable and is fairly easy to work.

This soil is suitable for cultivation only if it is drained. Where it is drained, it is suited to corn, small grains, sugarbeets, truck crops, and irrigated improved pasture. All the acreage is used for native pasture and hay. (Capability unit IIIw–2; Wet Meadow range site)

Chance-Ironton complex, 0 to 3 percent slopes (CIA).—This complex occurs on nearly level low lake terraces and fans. Slopes are generally less than 1 percent. About 80 percent of the complex is Chance loam, 0 to 3 percent slopes, and about 20 percent is Ironton silt loam, 1 to 3 percent slopes. These soils are described in their respective series. The Ironton soils are on small, irregularly shaped mounds scattered throughout larger areas of Chance loam. The Ironton soils are about 3 to 5 feet higher than the poorly drained Chance soils. Also in this complex are small areas of calcareous silt loam that have slopes steeper than 3 percent, and some areas of noncalcareous loam that are somewhat poorly drained.

Runoff is slow, and the hazard of erosion is slight.

The soils of this complex are used for unimproved pasture. Drainage is required before they can be cultivated. Where drained, these soils are suited to irrigated

improved pasture, corn, small grains, sugarbeets, and truck crops. (Chance soil is in capability unit IIIw–2 and Wet Meadow range site; Ironton soil is in capability unit IIw–4 and Semiwet Meadow range site)

Cobbly Alluvial Land

Cobbly alluvial land (Co) consists dominantly of cobbles, pebbles, and stones that have been deposited by streams. It occurs mainly along the Weber River and is subject to overflow. The coarse fragments consist of many kinds of rocks, but they are dominantly sandstone, limestone, and quartzite. Natural drainage is excessive, and the available water capacity is very low. The hazard of erosion is slight.

Most areas of this land have very limited use for pasture. Vegetation consists mostly of cottonwood and boxelder trees and an understory of willows, cheatgrass brome, and annual weeds. (Capability unit VIIw–1; not suited to range)

Croy Series

The Croy series consists of somewhat poorly drained soils that are moderately affected by salts and alkali. These soils are moderately deep over an indurated pan. They are nearly level soils and are in slight depressions on low lake terraces. They formed in alluvium and mixed lake sediments. Elevations range from about 4,225 to 4,350 feet above sea level.

The surface layer is dark grayish-brown, very friable loam 2 to 4 inches thick. The subsoil is dark-brown to brown, friable or firm fine sand, sandy loam, loam, sandy clay loam, or silty clay loam that has prismatic or subangular blocky structure. The indurated pan occurs at an average depth of about 35 inches and is 3 to 40 inches thick.

Croy soils commonly are near the Warm Springs, Leland, and Airport soils. The native vegetation consisted of saltgrass, alkali sacaton, scattered greasewood, and foxtail barley.

All the acreage of Croy soils is used as range.

Croy loam (Cr).—This soil occurs in slight depressions on low lake terraces or in drainageways in the southwestern part of Weber County, north and east of Hooper. It is in long, comparatively narrow areas, where it occurs with Leland, Airport, and Warm Springs soils. Slopes range from 0 to 2 percent.

A representative profile:

0 to 4 inches, dark grayish-brown loam; friable; platy structure; moderately calcareous; moderately alkaline.
4 to 18 inches, dark-brown sandy clay loam; firm, prismatic and subangular blocky structure; moderately calcareous; strongly alkaline.
18 to 32 inches, dark-brown or very dark grayish-brown sandy loam and fine sand; friable; weak subangular blocky structure or single grain; moderately calcareous; very strongly alkaline.
32 to 35 inches +, dark-gray indurated hardpan; moderately calcareous.

The surface layer ranges from about 2 to 4 inches in thickness. The subsoil ranges from sandy clay loam to loam or silty clay loam. The substratum below a depth of 18 to 20 inches ranges from fine sandy loam to silty clay loam. Depth to the hardpan ranges from 25 to 42 inches but is generally between 30 and 36 inches. Thickness of the hardpan ranges from 3 to 40 inches. In places there are two or more thin layers of hardpan that are separated by lenses of fine sandy loam or silt loam. This soil is moderately affected by salts and alkali. The water table fluctuates seasonally, but it is generally between depths of 30 and 48 inches.

Included with this soil in mapping were small areas of fine sandy loam and some areas of silty clay loam that are without a hardpan and are moderately to strongly affected by alkali.

This soil is somewhat poorly drained. Permeability is slow to moderate above the hardpan and very slow in the hardpan. This soil holds about 1.8 inches of available water per foot above the hardpan, or a total of about 3.5 to 5 inches of available water. Roots seldom penetrate the hardpan. Natural fertility is low. Runoff is slow, and the hazard of erosion is slight.

All of this soil is used as range. It is suited to irrigated improved pasture, where it is drained and reclaimed from damage by salts and alkali. (Capability unit VIw–1; Alkali Bottom range site)

Cudahy Series

The Cudahy series consists of poorly drained soils that are moderately deep over a lime-cemented pan. These soils are in nearly level depressions on low lake terraces. They formed in mixed, medium-textured sediments. Elevations range from about 4,220 to 4,450 feet above sea level.

The surface layer is black or very dark gray, friable silt loam 10 to 24 inches thick. The subsoil above the lime-cemented pan is gray, firm silt loam or light silty clay loam. The pan occurs at an average depth of about 26 inches.

Cudahy soils are commonly near the Ironton, Roshe Springs, and Logan soils. The vegetation consists mainly of saltgrass, Kentucky bluegrass, wiregrass, and sedges.

Cudahy soils are used for pasture or native hay and for irrigated crops.

Cudahy silt loam, 0 to 3 percent slopes (CuA).—This soil occurs in small, irregularly shaped, widely separated areas on low lake terraces. Slopes generally are less than 1 percent. The main areas of this soil are about one-half mile west of Woods Cross.

A representative profile:

0 to 16 inches, black or very dark gray silt loam; friable; granular structure; strongly calcareous; moderately alkaline.
16 to 23 inches, gray silt loam; firm; subangular blocky structure; strongly calcareous; moderately alkaline.
23 to 44 inches, gray, indurated, lime-cemented hardpan; strongly calcareous; moderately alkaline.
44 to 60 inches, gray silty clay loam; firm; massive; distinct mottles; strongly calcareous; moderately alkaline.

The surface layer ranges from about 10 to 24 inches in thickness. Depth to the hardpan and to the water table ranges from about 20 to 40 inches.

Included with this soil in mapping were small areas that have a hardpan nearer the surface than this soil and areas that are moderately affected by salts and alkali. Also included were small areas of medium-textured and moderately fine textured, poorly drained soils without a hardpan.

This soil is poorly drained. It is moderately to slowly permeable above the hardpan and very slowly permeable in it. Above the pan, about 2.2 inches of available water per foot of soil is held, or a total of about 4 to 6 inches. Roots penetrate only to the hardpan. Natural fertility is moderately high. Runoff is slow, and the hazard of erosion is not more than slight. This soil is friable and easy to till.

Open drains and tile have been installed in some areas. Cultivated crops are grown on about 55 percent of this soil, and other areas are in native pasture or hay. Where it is drained, this soil is well suited to and used for irrigated pasture and a grass-legume mixture for hay, and for cabbage, celery, onions, or other truck crops. (Capability unit IIIw–8; Wet Meadow range site)

Draper Series

The Draper series consists of deep, somewhat poorly drained, medium-textured soils. These soils are widely distributed in two general areas, the larger near Farmington and Bountiful and the smaller near North Ogden. They are on nearly level to strongly sloping alluvial fans and flood plains. They formed in noncalcareous or slightly calcareous alluvium that was derived from granite, gneiss, schist, and quartzite. Elevations range from about 4,250 to 5,000 feet above sea level.

The surface layer is black or very dark gray, friable loam or gravelly loam 10 to 30 inches thick. The subsoil and substratum are similar to the surface layer but become somewhat lighter colored as depth increases. The substratum is stratified.

Draper soils are commonly near the Chance, Ironton, and Woods Cross soils. The native vegetation consisted mainly of grasses and legumes.

The Draper soils are used mainly for irrigated crops and for pasture and hay.

Draper loam, drained, 0 to 1 percent slopes (DrA).—This soil occurs on a smooth, nearly level flood plain in the southeastern part of the survey area near Farmington and Bountiful. It occurs mainly with Woods Cross and Ironton soils.

A representative profile:

0 to 21 inches, black loam; friable; granular and subangular blocky structure; noncalcareous; mildly alkaline.
21 to 30 inches, black loam; friable; weak prismatic and granular structure; neutral.
30 to 60 inches, very dark gray loam; friable or firm; massive; noncalcareous; mildly alkaline.

The surface layer ranges from about 16 to 30 inches in thickness. It contains from 4 to 12 percent organic matter. The substratum is somewhat stratified. In places this soil is slightly calcareous. Depth to the water table ranges from about 36 inches to more than 60 inches.

Included with this soil in mapping were small areas of calcareous silt loam and areas of noncalcareous, poorly drained silty clay loam.

This soil has been artificially drained. It absorbs moisture readily, and its permeability is moderate. It holds about 2 inches of available water per foot of soil, or about 10 inches to a depth of 5 feet. Roots penetrate to a depth of 48 inches or more, but few reach below the water table. Runoff is slow, and the hazard of erosion is not more than slight. This soil is friable, is easy to work, and has high natural fertility.

Most of this soil is used for irrigated crops and for community developments. About 25 percent of the acreage is in native pasture or hay. The main crops are alfalfa, corn, small grains, sugarbeets, and tomatoes and other truck crops. Where drainage is adequate, this soil is well suited to irrigation and to many kinds of crops. (Capability unit IIw–3; Semiwet Meadow range site)

Draper loam, drained, 1 to 3 percent slopes (DrB).—This soil occurs mainly on gently sloping fans and flood plains. It is most extensive near Farmington and Bountiful but it also occurs near North Ogden. This soil is more sloping than Draper loam, drained, 0 to 1 percent slopes, and slightly more susceptible to erosion. The dark surface layer ranges from about 12 to 24 inches in thickness. The water table normally is below a depth of 36 inches, but it rises for a short time immediately following an irrigation.

Included with this soil in mapping were small areas of somewhat poorly drained, calcareous silt loam and areas of a soil that has a small amount of gravel throughout its profile.

Most areas of this Draper soil have been drained by tile or open drains and are cultivated. The soil is well suited to and is used for improved pasture, corn, a grass-legume mixture for hay, sugarbeets, and tomatoes and other truck crops. Drainage and control of the water table are the principal concerns of management. (Capability unit IIw–4; Semiwet Meadow range site)

Draper loam, drained, 3 to 6 percent slopes (DrC).—This moderately sloping soil occurs on alluvial fans and is moderately susceptible to erosion. It is more sloping than Draper loam, drained, 0 to 1 percent slopes, and is in higher positions. The surface layer ranges from about 10 to 20 inches in thickness. Runoff is medium, and the water table is commonly below a depth of 36 inches.

Included with this soil in mapping were small areas that have slopes of 6 to 10 percent, a few small areas of calcareous silt loam, and a small area where the substratum is gravelly.

About 80 percent of this soil is used for irrigated crops, and the rest is used for range. Improved pasture, a grass-legume mixture for hay, and small grains are the main crops and crops for which this soil is well suited. The main practices needed are those that improve drainage, control the water table, and control erosion. (Capability unit IIIw–1; Semiwet Meadow range site)

Draper loam, 0 to 1 percent slopes (DoA).—This nearly level soil occurs in small areas in slight depressions on the flood plains. Its water table is at a depth of 25 to 36 inches during much of the growing season, but otherwise this soil is similar to Draper loam, drained, 0 to 1 percent slopes. Slopes are generally smooth and in most places are less than 0.5 percent. In some places this soil is slightly calcareous.

Included with this soil in mapping were small areas of gravelly loam and of sandy loam and a few spots of deep, poorly drained loam.

Runoff is very slow, and the hazard of erosion is not more than slight. This soil is used mainly for unimproved pasture. It is suited to cultivated crops only if it is drained. Drained areas are well suited to irrigated

improved pasture and to irrigated sugarbeets, corn, small grains, and truck crops. (Capability unit IIw–3; Semiwet Meadow range site)

Draper loam, 1 to 3 percent slopes (DaB).—This soil occurs in slight depressions on flood plains. It is slightly susceptible to erosion. It is more sloping than Draper loam, drained, 0 to 1 percent slopes, and has a water table nearer the surface. The water table is generally at a depth of 25 to 36 inches.

This soil is used mainly for unimproved pasture. Adequately drained areas are well suited to irrigation and to many kinds of crops. (Capability unit IIw–4; Semiwet Meadow range site)

Draper gravelly loam, gravelly subsoil variant, 1 to 3 percent slopes (DsB).—This gravelly soil occurs on gently sloping alluvial fans and flood plains. Except for its content of gravel and its slightly steeper slopes, this soil is similar to Draper loam, drained, 0 to 1 percent slopes. Fine gravel makes up from 20 to 35 percent of the soil profile. The surface layer is commonly 15 to 24 inches thick. The subsoil and substratum range from gravelly loam to gravelly and cobbly loamy fine sand. From the surface to a depth of 5 feet, this soil holds about 8 inches of available water.

Included with this soil in mapping were areas of gravelly loam that have slopes of slightly more than 3 percent and small areas of loam that are not gravelly.

This gravelly soil is moderately difficult to till. Where it is drained, this soil is well suited to irrigated crops and is used mainly for them. The crops are alfalfa, small grains, corn, and improved pasture. Some of this soil is used for range and for community developments. (Capability unit IIw–4; Semiwet Meadow range site)

Draper gravelly loam, gravelly subsoil variant, 3 to 6 percent slopes (DsC).—This soil is on more sloping alluvial fans than Draper gravelly loam, gravelly subsoil variant, 1 to 3 percent slopes, and is more susceptible to erosion. Also, the content of gravel is somewhat more variable and ranges from about 20 to 50 percent. In some areas near the channels of intermittent streams, cobbles are scattered on the surface. Depth to the water table is commonly below a depth of 40 inches.

Drained areas of this soil are used mainly for irrigated crops; undrained areas are in range. Drained areas are well suited to improved pasture, a grass-legume mixture for hay, and small grains. (Capability unit IIIw–1; Semiwet Meadow range site)

Ford Series

The Ford series consists of somewhat poorly drained and poorly drained, nearly level soils that are moderately deep over a weakly cemented pan and are moderately affected by salts and alkali. These soils are in depressions on low lake terraces, immediately below the breaks of higher terraces. Ford soils formed in mixed sediments of medium and moderately coarse texture. Elevations range from 4,225 to 4,275 feet above sea level.

The surface layer is very dark grayish-brown, friable loam about 5 to 12 inches thick. The subsoil is brown, friable loam or fine sandy loam. Depth to the weakly cemented pan ranges from 20 to 40 inches but generally is about 30 inches.

Ford soils are commonly near the Airport, Payson, and Warm Springs soils. The native vegetation is mainly saltgrass, alkali sacaton, and greasewood.

These soils are used mainly as range.

Ford loam (Fa).—This soil occurs on smooth, level or nearly level low lake terraces near the breaks from higher terraces. It is moderately affected by salts and alkali. In most places it occurs with Airport silt loam and Warm Springs fine sandy loam. Slopes are less than 1 percent.

A representative profile:

0 to 9 inches, very dark grayish-brown loam; friable; granular structure; moderately calcareous; very strongly alkaline.
9 to 16 inches, dark grayish-brown loam; friable; blocky structure; strongly calcareous; very strongly alkaline.
16 to 34 inches, brown fine sandy loam; friable; massive; strongly calcareous; very strongly alkaline.
34 to 44 inches, grayish-brown fine sandy loam; weakly cemented; hard and brittle; strongly calcareous; strongly alkaline.
44 to 52 inches, brown fine sandy loam; loose; massive; strongly calcareous; very strongly alkaline.
52 to 60 inches, weakly cemented hardpan.

The loam surface layer ranges from about 5 to 10 inches in thickness. The hardpan is at a depth ranging from about 20 to 40 inches. It ranges from 3 to 24 inches in thickness and from weakly cemented to indurated. In many places two or more cemented layers occur in the profile and are separated by lenses of fine sandy loam. Depth to the water table ranges from about 24 to 60 inches but is generally between 30 and 36 inches.

Included with this soil in mapping were small areas of somewhat poorly drained fine sandy loam without a hardpan, areas of silty clay loam that have a hardpan, and areas of loam that are shallow to the water table. Also included were areas that have a knobby microrelief in which the knolls appear to be fine sandy loam deposited by the wind.

This somewhat poorly drained soil has moderate to slow permeability above the hardpan. The hardpan is very slowly permeable. This soil holds about 1.5 inches of available water per foot, or about 4 to 5 inches above the hardpan. Natural fertility is moderately low. Runoff is slow, and the hazard of erosion is none to slight. Tillage is moderately easy.

This soil is used mainly as unimproved pasture. Where it is drained and reclaimed from damage by salts and alkali, it is suited to irrigated improved pasture and to an occasional crop of a small grain. (Capability unit IVw–3; Alkali Bottom range site)

Ford loam, shallow water table (Fb).—This poorly drained soil occurs in slight depressions on low lake terraces. It is similar to Ford loam but has a water table at or near the surface most of the time. The high water table is a result mainly of seepage from higher soils and careless use of irrigation water. The surface soil ranges from about 7 to 12 inches in thickness. Depth to the hardpan ranges from about 20 to 30 inches.

Included with this soil in mapping were small areas of Ford loam and areas of fine sandy loam without a hardpan.

This soil is used mainly for unimproved pasture. It is not suited to cultivated crops, but where it is drained

and the salts and alkali removed, it can be used for irrigated improved pasture and an occasional crop of small grain. (Capability unit IVw–3; Salt Meadow range site)

Francis Series

The Francis series consists of deep, well-drained to somewhat excessively drained, nearly level to steep, sandy soils. These soils are on high lake terraces, mainly near the base of the Wasatch Mountains. They formed in sandy, windblown deposits. Elevations range from about 4,300 to 5,200 feet above sea level.

The surface layer is dark grayish-brown, friable loamy fine sand 5 to 16 inches thick. The subsoil extends to a depth of about 18 to 30 inches and consists of dark-brown, loose loamy fine sand. The substratum is dark-brown fine sand.

Francis soils are commonly near the Preston and Kidman soils and, in a few places, are near the Timpanogos and Kilburn soils. The native vegetation is mainly sand dropseed, Indian ricegrass, brushy Gambel oak, and sagebrush.

Francis soils are used for irrigated farming, mainly for orchard fruits, and for dryfarming, range, and community developments.

Francis loamy fine sand, 0 to 3 percent slopes (FcB).—This soil is smooth or gently undulating. It occurs on lake terraces, mainly in small areas near areas of Kilburn and Kidman soils.

A representative profile:

0 to 13 inches, dark grayish-brown loamy fine sand; friable; granular structure; noncalcareous; mildly alkaline.
13 to 23 inches, dark-brown loamy fine sand; very friable; massive; noncalcareous; moderately alkaline.
23 to 73 inches, dark-brown fine sand; loose; single grain; noncalcareous; mildly alkaline.

The surface layer ranges from about 8 to 16 inches in thickness. In places the substratum is weakly calcareous.

Included with this soil in mapping were small areas of fine sandy loam and areas of other Francis soils.

This soil absorbs moisture readily, is somewhat excessively drained, and is rapidly permeable. It holds about 0.75 inch of available water per foot of soil, or about 3.75 to 4 inches to a depth of 5 feet. Roots penetrate to a depth of 60 inches or more. Runoff is slow. Water erosion is only a slight hazard, but the hazard of soil blowing is high. Natural fertility is moderately low. This soil is friable and easy to work.

About 55 percent of this soil is cultivated and used for irrigated crops. The main irrigated crops are cherries, apricots, and peaches, crops that are well suited. Also well suited is irrigated improved pasture. About 20 percent of this soil is used for community developments. Efficient use of irrigation water and the control of soil blowing are the main concerns of management. (Capability unit IIIs–2; Upland Sand range site)

Francis loamy fine sand, 3 to 6 percent slopes (FcC).—This soil developed in sandy, windblown deposits on gently undulating high lake terraces. It is more sloping than Francis loamy fine sand, 0 to 3 percent slopes, and is moderately susceptible to water erosion. The surface layer ranges from about 7 to 14 inches in thickness. In some places a small amount of fine gravel occurs throughout the profile, and in other places a gravelly substratum is below a depth of 36 inches.

Included with this soil in the mapping were small areas that have slopes of more than 6 percent, areas of sandy loam, and a few small areas of gravelly sandy loam. Also included is a small area that has an overwash of loam 5 to 6 inches thick.

Runoff is slow to medium, and the hazard of erosion by water is commonly moderate. The hazard of soil blowing is high.

This soil is used for dryland farming, for irrigated farming, and for range. It is well suited to, and is used mainly for, small grains, alfalfa, cherries, apricots, peaches, and improved pasture. (Capability unit IIIs–3; Upland Sand range site)

Francis loamy fine sand, 6 to 10 percent slopes (FcD).—This soil is on strongly sloping lake terraces where it occurs with Kilburn and Preston soils. Except for stronger slopes, it is similar to Francis loamy fine sand, 0 to 3 percent slopes. The surface layer is about 6 to 12 inches thick. In places, the substratum is weakly calcareous. Water erosion is a moderate to high hazard.

Included with this soil in mapping were a few small areas of loamy fine sand that have horizons of carbonate accumulation and some areas of gravelly sandy loam.

This soil is used for irrigated farming, for dryfarming, and as range. Cultivated areas are suited to cherries, peaches, apricots, and irrigated improved pasture. Applying irrigation water by sprinklers lessens the risk of erosion and permits efficient use of the water. (Capability unit IVs–2; Upland Sand range site)

Francis loamy fine sand, 10 to 20 percent slopes, eroded (FcE2).—This soil is on high lake terraces, mainly in association with the Preston, Kilburn, and Timpanogos soils. It is similar to Francis loamy fine sand, 0 to 3 percent slopes, but is steeper and more eroded. The surface layer ranges from 5 to 10 inches in thickness. In places, some fine gravel occurs throughout the profile.

Included with this soil in mapping were a few small areas of fine sand and areas of loamy very fine sand to light sandy loam. Also included were areas of gravelly sandy loam that have slopes of less than 10 percent and some that are only slightly eroded.

Runoff is commonly medium, and the hazard of erosion is high.

This soil is used mainly as range and watersheds, but a small acreage is cultivated. This soil is suited to cherries, apricots, peaches, and irrigated improved pasture. Sprinkler irrigation is a good method of applying water because it lessens the risk of erosion and insures efficient use of irrigation water. (Capability unit IVs–3; Upland Sand range site)

Francis loamy fine sand, 20 to 30 percent slopes, eroded (FcF2).—This inextensive soil occurs on high terrace escarpments in the northeastern part of Davis County. Except for erosion and steep slopes, this soil is similar to Francis loamy fine sand, 0 to 3 percent slopes. The surface layer ranges from 5 to 9 inches in thickness.

Included with this soil in mapping were small areas that have slopes of less than 20 percent and small areas of fine sand.

All of this soil is used as range or watersheds. Cultivated crops are not suited. (Capability unit VIs–1; Upland Sand range site)

Francis-Kidman complex, 20 to 50 percent slopes, eroded (FKG2).—The soils in this complex are gently rolling and occur mainly on north-facing terrace escarpments along the south side of the valley of the Weber River. About 70 percent of the complex is Francis loamy fine sand on slopes of 30 to 50 percent, and 30 percent is Kidman fine sandy loam on slopes of 20 to 30 percent. These soils are so intermingled that they cannot be shown separately on the soil maps. The Francis soil in this complex is similar to Francis loamy fine sand, 10 to 20 percent slopes, eroded. The Kidman soil is similar to the Kidman fine sandy loam, 10 to 20 percent slopes, eroded, which is described under the Kidman series.

Included in areas mapped as this complex were small areas of fine sand and areas of fine sandy loam that have slopes steeper than 50 percent.

Most of this complex has a dense cover of brushy Gambel oak. Runoff is medium, and the hazard of erosion is high.

All of this complex is used as range or as watersheds. Cultivated crops are not suited. (Francis soil is in capability unit VIIs–1 and Upland Sand range site; Kidman soil is in capability unit VIe–1 and Upland Loam range site)

Gooch Series

The Gooch series consists of deep, poorly drained and somewhat poorly drained soils that have a horizon of accumulated lime immediately below the surface soil. These nearly level soils are in depressions on low lake terraces in the extreme north-central part of the survey area. They formed in medium-textured and moderately fine textured lake sediments. Elevations range from about 4,225 to 4,275 feet above sea level.

The surface layer is dark-gray or gray, friable silt loam or silty clay loam about 5 to 8 inches thick. The subsoil is gray to light-gray, firm clay loam that extends to an average depth of about 35 inches and contains much lime. The material below the subsoil is stratified and ranges from very fine sandy loam to loamy fine sand.

Gooch soils are commonly near the Warm Springs and Syracuse soils. The native vegetation is mainly saltgrass and some alkali sacaton and foxtail barley.

Gooch soils are used mainly as range, but small areas have been drained and are used for irrigated crops.

Gooch silt loam (Go).—This soil occurs in slight depressions on low lake terraces in the north-central part of the survey area about 2 miles northeast of Plain City. Slopes are less than 1 percent and are smooth to slightly undulating.

A representative profile:

0 to 8 inches, dark-gray silt loam; friable; platy structure; strongly calcareous; moderately alkaline.
8 to 30 inches, light-gray or gray clay loam; firm; weak subangular blocky structure in the upper 10 inches and massive below; strongly calcareous; strongly alkaline.
30 to 47 inches +, brown fine sandy loam; friable; massive; moderately calcareous; strongly alkaline.

The surface layer ranges from 6 to 8 inches in thickness. Depth to the water table dominantly is about 24 to 40 inches, but in some areas the water table is at or near the surface most of the time. The effect of salts and alkali ranges mainly from slight to moderate.

Included with this soil in mapping were small areas of silty clay loam and some areas that are strongly affected by salts and alkali.

This soil is somewhat poorly drained and poorly drained and has slow permeability. It holds about 1.2 to 1.5 inches of available moisture per foot, or about 6 to 8 inches to a depth of 5 feet. Few roots penetrate below a depth of 30 inches. Natural fertility is moderately low. Runoff is slow, and some areas are ponded at times. The hazard of erosion is slight. Tillage is moderately easy.

Most of this soil is used as range, but some areas have been drained and are used for cultivated crops and irrigated improved pasture. Corn and small grains are the principal crops. Where the soil is drained and reclaimed from damage by salts and alkali, it is suited to improved pasture and to an occasional crop of corn or a small grain. (Capability unit IVw–3; Salt Meadow range site)

Gooch silt loam, strongly alkali (Gs).—This soil is similar to Gooch silt loam, but it is strongly affected by salts and alkali, and its water table is at or near the surface much of the time. The surface layer ranges from about 5 to 7 inches in thickness. Because its content of salt is high, this soil is droughty.

Included with this soil in mapping were small areas of silty clay loam.

Runoff is very slow or ponded, and the hazard of erosion is none to slight. Natural fertility is low.

All of this soil is used as unimproved pasture. Because of the high content of salts and alkali and the high water table, cultivation is not practical. In addition, drainage is difficult because the soil is in low positions that lack adequate outlets. (Capability unit VIIw–1; Salt Meadow range site)

Harrisville Series

The Harrisville series consists of deep, somewhat poorly drained and moderately well drained, nearly level to undulating soils that are slightly to moderately affected by alkali. These soils are on low terraces, mainly in the northern and central parts of the survey area. They formed in medium-textured mixed lake sediments. Elevations range from about 4,250 to 4,500 feet above sea level.

The surface layer is very dark grayish-brown or very dark brown, friable silt loam 6 to 9 inches thick. The subsoil is brown to dark-brown, firm, subangular blocky silty clay loam. The substratum is brown, firm, massive silty clay loam.

Harrisville soils are commonly near the Leland, Logan, and Ironton soils. The native vegetation is bunch grasses, gumweed, cheatgrass brome, and peppergrass.

Harrisville soils are used as range and for irrigated farming.

Harrisville silt loam, 0 to 1 percent slopes (HaA).—This soil is on nearly level to slightly undulating low lake terraces in the northern part of the survey area. It occurs mainly with the Leland, Ironton, and Logan soils.

A representative profile:

0 to 8 inches, very dark grayish-brown silt loam; friable; granular structure; slightly calcareous; moderately alkaline.
8 to 14 inches, brown to dark-brown silty clay loam; firm; prismatic structure; moderately calcareous; strongly alkaline.
14 to 33 inches, brown silty clay loam; firm; subangular blocky structure; strongly calcareous; strongly alkaline.
33 to 60 inches, brown silty clay loam; firm; massive; strongly calcareous; strongly alkaline.

The surface layer ranges from about 6 to 9 inches in thickness. This soil is slightly to moderately affected by alkali. Depth to the water table ranges from about 30 to 48 inches.

Included with this soil in mapping were a few small areas of silty clay loam and areas of fine sandy loam.

This soil is somewhat poorly drained and slowly permeable to water. It holds about 1.8 inches of available water per foot, or about 8 or 9 inches to a depth of 5 feet. Roots seldom penetrate below the subsoil. Natural fertility is moderately high. Runoff is slow, and the hazard of erosion is slight. Tillage is difficult.

Some areas of this soil are used for irrigated farming, some for dryfarming, and some as range. Alfalfa, small grains, and improved pasture are the principal irrigated crops. Dryfarmed areas are used for winter wheat in alternate years. Where it is drained and reclaimed from damage by alkali, this soil is well suited to irrigated improved pasture and to an occasional crop of corn or a small grain. (Capability unit IIIw–4; Semiwet Meadow range site)

Harrisville silt loam, 1 to 3 percent slopes (HaB).—This soil occurs mainly on the remnants of dissected lake terraces near other Harrisville soils. It is similar to Harrisville silt loam, 0 to 1 percent slopes, but is slightly more sloping. The surface layer ranges from about 6 to 8 inches in thickness.

Included with this soil in mapping were a few small areas of silty clay loam.

This soil is slightly to moderately affected by alkali. Depth to the water table ranges from about 36 to 50 inches.

This soil is used for dryfarmed crops, for irrigated crops, or as range. In irrigated areas it is used mainly for small grains, alfalfa, and improved pasture. Where it is drained and reclaimed from damage by alkali, this soil is well suited to irrigated improved pasture and to an occasional crop of a small grain or of corn. (Capability unit IIIw–5; Semiwet Meadow range site)

Harrisville silt loam, 3 to 6 percent slopes (HaC).—This inextensive soil occurs in small areas on the moderately sloping remnants of lake terraces and on terrace breaks near North Ogden. It is similar to Harrisville silt loam, 0 to 1 percent slopes, but it has stronger slopes and is moderately susceptible to erosion. The surface layer is commonly 5 to 8 inches thick.

Runoff is medium, and the hazard of erosion is generally moderate.

This soil is used as range, for dryfarmed crops, and for irrigated crops. It is suited to small grains, alfalfa, and irrigated improved pasture. Practices are needed for maintaining drainage ditches, for occasional deep leaching to remove alkali and for controlling erosion. (Capability unit IIIw–5; Semiwet Meadow range site)

Harrisville-Leland complex, 0 to 1 percent slopes (HLA).—This complex consists of large areas of nearly level and gently undulating soils on low lake terraces in the north-central part of the survey area. It is about 60 percent Harrisville silt loam, 0 to 1 percent slopes, and about 40 percent Leland silt loam. Each of these soils is described in its respective series. Normally, the Harrisville soil is on low knolls, and the Leland soil is in slight depressions, but in some areas differences in position cannot be seen.

Included with this complex in the mapping were areas of dark-colored, calcareous silt loam.

The soils in this complex are somewhat poorly drained in most places. Runoff is slow, and the hazard of erosion is slight.

These soils are used mainly as range and for dryfarming. Only a few small areas are irrigated. Small grains are the principal dryfarmed crops .Where these soils are drained and reclaimed from damage by alkali, they are suited to irrigated improved pasture and to an occasional crop of corn or a small grain. (Harrisville soil is in capability unit IIIw–4 and Semiwet Meadow range site; Leland soil is in capability unit VIw–1 and Alkali Bottom range site)

Hillfield Series

The Hillfield series consists of deep, well-drained, eroded soils that are strongly sloping to very steep. These soils occur on south- and west-facing escarpments of lake terraces. They formed in medium-textured and moderately fine textured sediments that were derived from many kinds of rocks. Elevations range from 4,400 to 5,100 feet above sea level.

The surface layer is brown to dark-brown, friable silt loam or fine sandy loam 2 to 8 inches thick. The subsoil is brown to dark-brown, friable silt loam or silty clay loam that contains more lime than the surface layer. The substratum is brown, stratified very fine sandy loam and clay loam.

Hillfield soils are mainly near the Timpanogos, Parleys, Ackmen, Marriott, and Preston soils. The native vegetation is mainly brushy Gambel oak and bunch grasses.

Hillfield soils are used for dryfarming, for irrigated farming, and as range.

Hillfield-Timpanogos-Parleys complex, 20 to 30 percent slopes, eroded (HTF2).—This complex occurs dominantly on moderately steep, slightly convex or slightly rolling terrace escarpments. About 60 percent of this complex is Hillfield soils, about 20 percent is Timpanogos soils, and about 20 percent is Parleys soils. In about half of their acreage, the Hillfield soils have a silt loam surface layer, and in about half, they have a fine sandy loam surface layer. The Timpanogos soils are similar to Timpanogos loam, 3 to 6 percent slopes, and the Parleys soils are similar to Parleys loam, 0 to 1 percent slopes, except that both kinds of soils have slopes of 20 to 30 percent, are moderately eroded, and have a surface layer that is commonly 6 to 10 inches thick.

A representative profile of the Hillfield soils:

0 to 6 inches, dark-brown silt loam; friable; granular structure; strongly calcareous; mildly alkaline.

6 to 21 inches, dark-brown silt loam; slightly hard or friable; subangular blocky structure; strongly calcareous; mildly to moderately alkaline.
21 to 60 inches, brown, stratified very fine sandy loam and clay loam; friable; thick platy structure; strongly calcareous; moderately alkaline.

The surface layer of Hillfield soils ranges from about 2 to 6 inches in thickness and from fine sandy loam to silt loam in texture. Texture varies considerably throughout the profile. In most places the Hillfield soils are somewhat more stratified than the Timpanogos and Parleys soils.

Included with this complex in mapping were small areas of fine sandy loam that have accumulations of carbonates and areas of loamy fine sands and of loams that are noncalcareous throughout their profiles.

The soils in this complex are well drained and have moderate and moderately slow permeability. They hold about 2 inches of available water per foot, or about 10 inches to a depth of 5 feet. Roots penetrate the Timpanogos and Parleys soils to a depth of 60 inches or more, but very few roots penetrate below a depth of 24 inches in the Hillfield soils. Natural fertility is moderately high in the Timpanogos and Parleys soils and is low in the Hillfield soils. Runoff is rapid, and the hazard of erosion is high. All these soils are moderately eroded but are friable and easy to work.

The soils in this complex are used largely as range, but some areas are dryfarmed. Control of erosion is the principal concern of management. (Capability unit VIe–1; Upland Loam range site)

Hillfield-Timpanogos-Parleys complex, 30 to 60 percent slopes, eroded (HTG2).—This complex consists of steep soils that occur on terraces and terrace escarpments. About 60 percent of the complex is Hillfield soils that have a silt loam surface layer and slopes of 30 to 60 percent; 20 percent is Timpanogos soils that have a loam surface layer and slopes of 30 to 40 percent; and 20 percent is Parleys soils that have a loam surface layer and slopes of 30 to 40 percent. The soils in this complex are similar to the corresponding soils in Hillfield-Timpanogos-Parleys complex, 20 to 30 percent slopes, eroded, except that they are steeper and are more susceptible to further erosion.

Runoff is rapid, and the hazard of erosion is high.

The soils of this complex are used as range and watersheds. Because slopes are steep, these soils are not suited to cultivated crops. (Capability unit VIIe–1; Upland Loam range site)

Hillfield soils, 6 to 10 percent slopes, eroded (HnD2).—These soils occur mainly on strongly sloping or gently undulating terrace escarpments. About 50 percent of the mapping unit is Hillfield soils that have a silt loam surface layer, and 50 percent is Hillfield soils that have a fine sandy loam surface layer. The soils in this mapping unit are similar to those in Hillfield soils, 10 to 20 percent slopes, eroded, except that they are less sloping, are less susceptible to erosion, and have a surface layer that is commonly 6 to 8 inches thick. Runoff is medium to rapid.

The soils of this unit are used mainly for dryfarmed and irrigated crops. The principal crops are small grains and alfalfa, and there is considerable improved pasture. These soils are well suited to cherry, peach, and apricot orchards and to irrigated improved pasture. (Capability unit IIIe–3; Upland Loam range site)

Hillfield soils, 10 to 20 percent slopes, eroded (HnE2).—These moderately steep, moderately eroded soils occur mainly on the south and west faces of escarpments. About 60 percent of the mapping unit is Hillfield soils that have a silt loam surface layer, and 40 percent is Hillfield soils that have a fine sandy loam surface layer. Both kinds of soils are somewhat similar to the Hillfield soil described in Hillfield-Timpanogos-Parleys complex, 20 to 30 percent slopes, eroded. They are less sloping, however, and have a surface layer commonly 4 to 7 inches thick and a subsoil that is dominantly silt loam but ranges to light silty clay loam. Also, the fine sandy loam has a coarser textured surface layer. A few small areas have a loam surface layer, and there are a few small inclusions that have slopes of 6 to 10 percent.

The soils in this unit are well drained. Runoff is medium to rapid, and the hazard of erosion is moderate.

The soils are used mainly for dryfarmed wheat. They are suited to improved pasture and to cherry, apricot, and peach orchards. Where these soils are irrigated, sprinklers lessen the risk of erosion and insure the most efficient use of irrigation water. (Capability unit IVe–4; Upland Loam range site)

Hillfield-Marriott complex, 30 to 60 percent slopes, eroded (HMG2).—These soils occur on very steep breaks and escarpments of terraces that are between the low-lying valley of the Weber River and the higher deltas and terraces. About 50 percent of this complex is Hillfield soils that have a fine sandy loam surface layer, and about 40 percent is Marriott soils that have a gravelly sandy loam surface layer. In each of these soils, the texture of the surface layer varies considerably. These soils are so intermingled that it was not practical to show each kind of soil as a separate unit on the soil map. Also in this complex are small areas of fine sand, loamy fine sand, loam, and gravelly sandy loam and a few small areas of Cobbly alluvial land.

The Hillfield soils in this mapping unit are similar to the Hillfield silt loam described in Hillfield-Timpanogos-Parleys complex, 20 to 30 percent slopes, eroded, except that they have a fine sandy loam surface layer, are steeper, and are more susceptible to erosion. Except for steeper slopes, the Marriott soils in this complex are similar to Marriott cobbly sandy loam, 10 to 30 percent slopes, eroded, described under the Marriott series.

The soils of this complex are well drained and somewhat excessively drained. Runoff is rapid, and the hazard of erosion is high.

All of the acreage of this complex is used as range or watersheds. These soils are not suited to cultivated crops. A permanent cover is needed to help control erosion. (Hillfield soil is in capability unit VIIe–1 and Upland Loam range site; Marriott soil is in capability unit VIIs–1 and Upland Gravelly Loam range site)

Ironton Series

The Ironton series consists of deep, nearly level to moderately sloping, somewhat poorly drained and moderately well drained, medium-textured soils. These soils are mainly on low lake terraces and flood plains. They

formed in silty, highly calcareous lake sediments. Elevations range from 4,200 to 4,750 feet above sea level.

The surface layer is very dark gray, friable silt loam about 16 to 22 inches thick. The subsoil is grayish-brown, friable silt loam or loam that is rich in lime. The substratum is similar to the subsoil but contains somewhat less lime.

Ironton soils are commonly near the Logan, Roshe Springs, Cudahy, and Draper soils. The native vegetation is mainly saltgrass, Kentucky bluegrass, wiregrass, and sedges.

Ironton soils are used for irrigated crops and for pasture.

Ironton silt loam, 0 to 1 percent slopes (IaA).—This soil is mainly smooth or slightly undulating. It occurs on low lake terraces and flood plains, mainly in two general areas. One area is northwest of Ogden, and the other is west of Kaysville, Farmington, and Centerville.

A representative profile:

0 to 16 inches, very dark gray silt loam; friable; granular structure; strongly calcareous; moderately alkaline.
16 to 21 inches, very dark grayish-brown loam; friable; subangular blocky structure; very strongly calcareous; moderately alkaline.
21 to 48 inches, grayish-brown loam and silt loam; friable ranging to hard; massive; weakly cemented in the lower part; very strongly calcareous; moderately alkaline.
48 to 60 inches, grayish-brown silt loam; friable; massive; strongly calcareous; moderately alkaline.

The dark surface layer ranges from about 16 to 22 inches in thickness. The substratum ranges from loam to silt loam. In places the layer of lime accumulation is weakly cemented. The water table dominantly is at a depth of about 24 to 40 inches. Figure 8 shows a profile of this soil.

Included with this soil in the mapping were a few small areas of poorly drained silty clay loam, loam, and silt loam. Also included were a few small areas that were slightly affected by salts and alkali.

This soil is somewhat poorly drained and moderately permeable. It holds about 2 inches of available water per foot of soil, or about 10 inches to a depth of 5 feet. Roots normally penetrate to the water table. Natural fertility is moderately high. Runoff is slow, and the hazard of erosion is none to slight.

Many areas of this soil have been drained by tile or open drains, and most of the acreage is in irrigated crops and improved pasture. The main crops are alfalfa, corn, small grains, sugarbeets, and tomatoes. Only about 10 percent is in pasture consisting of native grasses. Drainage and control of irrigation water are the main concerns of management. (Capability unit IIw–3; Semiwet Meadow range site)

Ironton silt loam, 1 to 3 percent slopes (IaB).—This soil is gently sloping or gently undulating. It occurs on flood plains and low lake terraces, mainly with Logan and Roshe Springs soils. In a small area south of Hill Air Force Base, this soil occurs with Timpanogos and Parleys soils. This area is on terrace breaks where there are seeps. This soil is similar to Ironton silt loam, 0 to 1 percent slopes, but it is more sloping. The surface layer ranges from about 16 to 18 inches in thickness.

Runoff is slow, and the hazard of erosion is slight.

Most areas of this soil are drained and used for irrigated crops and improved pasture. The principal crops are alfalfa, corn, small grains, sugarbeets, and tomatoes. Drained areas are well suited to these crops. (Capability unit IIw–4; Semiwet Meadow range site)

Figure 8.—Profile of Ironton silt loam, 0 to 1 percent slopes. The dark surface layer is underlain by a light-colored layer that contains accumulated lime.

Ironton silt loam, 3 to 6 percent slopes (IaC).—This gently undulating or gently sloping soil occurs mainly on flood plains and low lake terraces, but in places it is on higher terrace breaks where seeps occur. It is similar to Ironton silt loam, 0 to 1 percent slopes, but is more sloping. The surface layer is commonly 16 to 18 inches thick. Depth to the water table is dominantly 40 to 50 inches. In a few places, the substratum is gravelly below a depth of 36 inches.

Included with this soil in the mapping were a few small areas that have slopes of slightly more than 6 percent and small areas of silty clay loam.

Runoff is slow to medium, and the hazard of erosion is slight to moderate.

This soil is used mainly for dryfarmed wheat and for irrigated crops and improved pasture. The main irrigated crops are small grains and alfalfa, which are well

suited after this soil is drained. (Capability unit IIIw–1; Semiwet Meadow range site)

Ironton silt loam, moderately alkali, 0 to 1 percent slopes (IcA).—This nearly level soil occurs on smooth flood plains or in slight depressions of low lake terraces. It occurs mainly with Harrisville silt loam, 0 to 1 percent slopes, Warm Springs fine sandy loam, 0 to 1 percent slopes, and Roshe Springs silt loam. Except that this soil is moderately affected by salts and alkali, it is similar to Ironton silt loam, 0 to 1 percent slopes. The surface layer is about 16 to 20 inches thick. Depth to the water table dominantly is about 24 to 36 inches.

Included with this soil in the mapping were small areas of silt loam that were not affected by alkali and a few spots that were strongly affected.

This soil is used mainly for unimproved pasture and for irrigated improved pasture. Because of the high water table, this soil is slow to warm in the spring and planting is often delayed. Also, root penetration is restricted by the high water table. Areas that have been drained and reclaimed from damage by salts and alkali are well suited to irrigation and to many kinds of crops. In removing salts and alkali, drainage followed by leaching is needed. (Capability unit IIIw–4; Semiwet Meadow range site)

Ironton-Draper complex, 0 to 3 percent slopes (IDA).—This complex consists of nearly level to gently sloping soils on flood plains about 1 mile west of Farmington. About 60 percent of the complex is Ironton silt loam, 1 to 3 percent slopes, and 40 percent is Draper loam, 0 to 1 percent slopes. These soils are described under their respective series. The Ironton soil is on slight knolls or ridges, and the Draper soil is in swales. The areas of each are so small and so intermingled that separating them on the soil map is not practical.

In areas of this complex that have been leveled, the Ironton soil has been removed from the knolls so as to fill the swales. In areas not leveled, the surface of the Ironton soil is 2 to 3 feet higher than that of the Draper soil.

Included with this complex in the mapping were some areas that have slopes of slightly more than 3 percent.

The soils of this complex are used as range and for irrigated crops. The irrigated crops are mainly small grains, alfalfa, sugarbeets, corn, and tomatoes. In adequately drained areas these soils are well suited to irrigation and to many kinds of crops. (Ironton soil is in capability unit IIw–4; Draper soil is in capability unit IIw–3; both soils are in Semiwet Meadow range site)

Kidman Series

The Kidman series consists of deep, well drained and moderately well drained, moderately coarse textured soils. These soils formed in sandy mixed sediments laid in old lakes and along the shore of the lakes. The sediments along the shore have been extensively reworked. These soils most commonly are on broad lake terraces. They are generally nearly level to gently sloping, but slopes are as much as 20 percent in some places. Elevations range from about 4,225 to 5,100 feet above sea level.

The surface layer is dark-brown, friable fine sandy loam 7 to 20 inches thick. The subsoil is brown, friable fine sandy loam that has subangular blocky structure. The substratum is brown, friable, massive silt loam, very fine sandy loam, or fine sandy loam. Lime leached from the surface layer and subsoil has been deposited in the upper part of the substratum.

Kidman soils commonly are near the Layton, Timpanogos, Parleys, and Francis soils. The native vegetation is mainly brushy Gambel oak, bunch grasses, and sagebrush.

Nearly all the acreage of Kidman soils is used for irrigated crops.

Kidman fine sandy loam, 0 to 1 percent slopes (KaA).—This extensive, nearly level soil is on broad lake terraces of medium height. It is widely distributed throughout the survey area but is mainly in the central and north-central parts. It occurs in large areas with Timpanogos and Layton soils.

A representative profile:

0 to 11 inches, dark-brown fine sandy loam; friable; granular structure; noncalcareous; mildly alkaline.
11 to 17 inches, dark-brown fine sandy loam; friable; subangular blocky structure; noncalcareous; neutral.
17 to 27 inches, brown fine sandy loam; friable; subangular blocky structure; noncalcareous; neutral.
27 to 58 inches, brown fine sandy loam and very fine sandy loam; very friable; massive; strongly calcareous; mildly and moderately alkaline.

The surface layer ranges from about 12 to 20 inches in thickness. In places the subsoil is slightly brighter and has stronger structure than the subsoil described as representative. Depth to the layer of lime accumulation is commonly 25 to 40 inches, but it is slightly more than 40 inches in places. In places a water table and distinct mottles occur at a depth of more than 40 inches.

Included with this soil in the mapping were small areas that have slopes slightly more than 1 percent and a few areas that are moderately eroded by soil blowing. Also included were some small areas of loam, sandy loam, and loamy fine sand.

This soil is well drained and moderately well drained, absorbs moisture readily, and has moderate to moderately rapid permeability. It holds about 1.5 inches of available water per foot of soil, or about 7.5 to 8 inches to a depth of 5 feet. Roots penetrate deeply. Runoff is slow. Water erosion is a slight hazard, and the hazard of soil blowing is moderate during winter and spring in areas that are left bare. This soil is friable, and tillage is easy.

Most of this soil is used for irrigated crops. It is well suited to irrigation and to many kinds of crops. These crops are alfalfa, sugarbeets, tomatoes, corn, small grains, potatoes, cherries, peaches, and apricots. (Capability unit I–2; not used for range)

Kidman fine sandy loam, 1 to 3 percent slopes (KaB).—This extensive soil occurs on broad, gently sloping or gently undulating lake terraces. It is more sloping than Kidman fine sandy loam, 0 to 1 percent slopes. The surface layer ranges from about 10 to 20 inches in thickness. Depth to accumulated lime is commonly 30 to 36 inches.

Included with this soil in the mapping were small areas that have slopes of more than 3 percent and small areas of loam and loamy fine sand.

Runoff is slow, and the hazard of erosion by water is slight to moderate. The hazard of soil blowing is mod-

erate in areas that are left bare during winter and spring.

Most of this soil is used for irrigated crops. The main crops are alfalfa, sugarbeets, tomatoes, corn, small grains, and potatoes. This soil is well suited to irrigation and to many kinds of crops. (Capability unit IIe–3; not used for range)

Kidman fine sandy loam, 3 to 6 percent slopes (KaC).—This soil is on gently undulating lake terraces, where it occurs mainly with the Timpanogos and Parleys soils. It is more sloping than Kidman fine sandy loam, 0 to 1 percent slopes, and is moderately susceptible to water erosion. The surface layer ranges from 9 to 18 inches in thickness. Depth to accumulated lime is commonly 24 to 36 inches.

Included with this soil in the mapping were small areas of loam and loamy fine sand and some areas that have slopes of less than 3 percent. Also included were areas of soils that are mottled and have a water table that is below a depth of 40 inches.

Runoff is medium, and the hazard of erosion is moderate.

Most of this soil is used for irrigated crops. It is well suited to, and used mainly for, cherries, apricots, alfalfa, and small grains. (Capability unit IIIe–2; not used for range)

Kidman fine sandy loam, 6 to 10 percent slopes (KaD).—This soil occurs in small, widely scattered areas on strongly sloping or gently undulating lake terraces, where it occurs mainly with Timpanogos loam. Except for having steeper slopes, it is similar to Kidman fine sandy loam, 0 to 1 percent slopes. The surface layer is commonly 8 to 16 inches thick. Depth to accumulated lime is 22 to 32 inches in most places.

Included with this soil in the mapping were small areas of loam and loamy fine sand. Also included were small areas that have slopes of less than 6 percent.

Runoff is medium, and the hazard of erosion is moderate to high. This soil is used for dryfarmed wheat and for irrigated crops. The irrigated crops are mainly cherries, apricots, peaches, alfalfa, and small grains. This soil is also well suited to irrigated improved pasture. Management to control erosion is needed. (Capability unit IIIe–3; Upland Loam range site)

Kidman fine sandy loam, 10 to 20 percent slopes, eroded (KaE2).—This eroded soil is in small areas on lake terraces, where it occurs mainly with Timpanogos, Parleys, Preston, and Hillfield soils. This soil is moderately steep and is moderately eroded, but it is otherwise similar to Kidman fine sandy loam, 0 to 1 percent slopes. The surface layer is 7 to 14 inches thick. Depth to accumulated lime is generally 20 to 30 inches. In places the surface layer is slightly calcareous.

Included with this soil in the mapping were small areas that have slopes of less than 10 percent and small areas of loam and loamy fine sand.

Runoff is medium to rapid, and the hazard of erosion is high.

This soil is used mainly as range and for dryfarmed wheat, but some areas are used for irrigated crops. It is well suited to cherries, apricots, and peaches. Management is needed to control erosion. (Capability unit IVe–4; Upland Loam range site)

Kilburn Series

The Kilburn series consists of deep and moderately deep, well-drained and excessively drained soils that are gravelly in most places and in some places are also stony and cobbly. These soils are on alluvial fans, terraces, and old deltas, mostly near the base of the Wasatch Mountains. They formed in moderately coarse textured alluvium and colluvium that was derived from weathered gneiss, quartzite, granite, and schist. Most areas are gently sloping to moderately steep, but some are steep. Elevations range from 4,400 feet to 5,300 feet above sea level.

The surface layer is very dark brown or very dark grayish-brown, very friable or friable, gravelly, cobbly, or stony sandy loam 5 to 20 inches thick. The subsoil is friable cobbly or stony sandy loam that is olive brown or light olive brown ranging to brown or dark brown. The substream has the same range of colors as the subsoil but is very gravelly, very cobbly, or stony sandy loam to very gravelly or cobbly sand.

Kilburn soils are commonly near the Francis, Marriott, Ridd, and Ackmen soils. The native vegetation consisted mainly of brushy Gambel oak, sagebrush, and bunch grasses.

The Kilburn soils are used for irrigated orchards, community developments, watersheds, and range.

Kilburn gravelly sandy loam, 6 to 10 percent slopes (KgD).—This soil occurs on sloping to strongly sloping fans. A representative profile:

0 to 5 inches, very dark brown gravelly sandy loam; friable; granular structure; slightly acid.
5 to 11 inches, very dark brown gravelly sandy loam; friable; subangular blocky structure; slightly acid.
11 to 24 inches, olive-brown cobbly sandy loam; friable; subangular blocky structure; slightly acid.
24 to 60 inches, olive-brown very gravelly loamy coarse sand; very friable; single grain; slightly acid.

The surface layer ranges from about 5 to 14 inches in thickness. Pebbles and cobbles make up, by volume, 10 to 40 percent of this layer and 25 to 60 percent of the soil mass below a depth of 20 inches.

Included with this soil in mapping were a few areas of nongravelly loamy fine sand and deep loam. Also included were small areas that have slightly steeper slopes.

This soil is well drained and has rapid permeability. It holds about 1.2 inches of available water per foot of soil in the surface layer and about 0.5 inch per foot in the lower layers, or about 3.75 to 4 inches to a depth of 5 feet. Plant roots penetrate to a depth of 48 inches or more. Natural fertility is moderate. Runoff is medium, and the hazard of erosion is moderate. This gravelly soil is moderately difficult to till.

About 33 percent of this soil is above the present irrigation canals and is used as range and watersheds. About 50 percent is used for irrigated crops, mainly cherries, apricots, and peaches. This soil is also suited to irrigated permanent pasture. Control of erosion and efficient use of water are the most important concerns of management. The use of this soil for community developments is increasing rapidly. (Capability unit IVs–2; Upland Gravelly Loam range site)

Kilburn gravelly sandy loam, 1 to 3 percent slopes (KgB).—This nearly level soil occurs mainly on the lower part of smooth alluvial fans. It is next to Kilburn gravelly sandy loam, 6 to 10 percent slopes, and is similar to that soil but less sloping. Gravel occurs throughout the profile, and in most places the content of gravel and cobbles increases with increasing depth. The surface layer ranges from about 7 to 12 inches in thickness and is from 20 to 35 percent gravel, by volume. In places the subsoil is very gravelly and very cobbly sandy loam or loamy sand.

Included with this soil in the mapping were a few small areas of deep, nongravelly loam and some small areas of cobbly sandy loam. Also included were some small areas that have slopes of slightly more than 3 percent.

This soil is well drained and moderately permeable to rapidly permeable. Available water capacity is about 1.2 inches per foot of soil in the upper 2 feet and 0.5 inch per foot between depths of 2 and 5 feet. From 3.8 to 4 inches of water is available to plants between the surface and a depth of 5 feet. Natural fertility is moderate. Runoff is slow, and the hazard of erosion is slight. Tillage is moderately difficult.

This soil is used mainly for community developments, but about 35 percent is cultivated. The cultivated acreage is mostly in fruit orchards. This soil is suitable for cherries, apricots, peaches, and small fruits and for irrigated improved pasture. Sprinklers permit the most efficient use of irrigation water. (Capability unit IIIs–2; not used for range)

Kilburn gravelly sandy loam, 3 to 6 percent slopes (KgC).—This moderately sloping soil occurs on the lower part of smooth to slightly convex alluvial fans. It is less sloping than Kilburn gravelly sandy loam, 6 to 10 percent slopes, but it contains a smaller amount of gravel and cobbles throughout the profile. The surface layer ranges from 8 to 18 inches in thickness.

Included with this soil in the mapping were small areas that have slopes of more than 6 percent, a few areas of nongravelly loamy fine sand, and a few of deep loam.

This soil is well drained and is rapidly permeable. Roots penetrate deeply. Runoff is medium to slow, and the hazard of erosion is moderate. This soil is well suited to, and is used mainly for, irrigated crops, improved pasture, and grass-legume hay. The principal crops are alfalfa, small grains, cherries, apricots, and peaches. Sprinkler irrigation permits more efficient use of water than other methods. (Capability unit IIIs–3; not used for range)

Kilburn gravelly sandy loam, 10 to 20 percent slopes, eroded (KgE2).—This soil is on complex slopes of broad, alluvial fans at the foot of the Wasatch Mountains. Except for steeper slopes, this soil is similar to Kilburn gravelly sandy loam, 6 to 10 percent slopes.

The surface layer ranges from about 6 to 14 inches in thickness. By volume, this layer is from 10 to 40 percent pebbles and cobbles. Below a depth of 20 inches, 25 to 60 percent of the soil mass is gravel and cobbles.

Included with this soil in the mapping were small areas of nongravelly loam, loamy fine sand, cobbly sandy loam, and stony sandy loam.

This soil is well drained and is rapidly permeable. Runoff is medium. The hazard of erosion is moderate to high and depends on the percentage of slope and the kind and amount of vegetation.

Most areas of this soil are higher than the irrigation canals and are used as range and watersheds. Some areas are used for community developments. About 35 percent of the acreage is cultivated. Peaches, apricots, and cherries are well suited and are the principal crops. Improved pasture is also well suited. Sprinklers cause less erosion than other methods of irrigation and permit the most efficient use of irrigation water. (Capability unit IVs–3; Upland Gravelly Loam range site)

Kilburn cobbly sandy loam, 3 to 10 percent slopes (KlC).—This soil occurs on short, slightly convex slopes of alluvial fans, mainly along or near the channel of intermittent streams. The surface is undulating or gently rolling. Recently deposited cobbles are on the surface in many places. Cobbles make up 30 to 50 percent of the volume throughout the profile, but this soil is otherwise similar to Kilburn gravelly sandy loam, 6 to 10 percent slopes. The surface layer ranges from about 6 to 14 inches in thickness.

Included with this soil in the mapping were areas of Cobbly alluvial land and a few areas of soils that have a gravelly sandy loam surface layer. Cobbly alluvial land makes up 5 to 10 percent of the area mapped.

This soil is rapidly permeable and somewhat excessively drained. From the surface to a depth of 5 feet, available water capacity is 3 to 3.5 inches. Runoff is medium, and the hazard of erosion is slight to moderate. The many cobbles make tillage difficult.

Most areas of this soil are used as range and watersheds. Some areas are well suited to cherries, apricots, and peaches, which are the principal crops in cultivated areas. Sprinkler irrigation is advisable because it permits efficient use of irrigation water. (Capability unit IVs–2; Upland Gravelly Loam range site)

Kilburn cobbly sandy loam, 10 to 20 percent slopes, eroded (KlE2).—This moderately steep soil is similar to Kilburn cobbly sandy loam, 3 to 10 percent slopes, but it is moderately eroded. The surface layer is 30 to 50 percent cobbles by volume. It ranges from about 6 to 12 inches in thicknes.

Included with this soil in the mapping were small areas of gravelly sandy loam and a few small areas of Cobbly alluvial land.

This soil is somewhat excessively drained. Runoff is medium, and the hazard of erosion is moderate to high. Tillage is difficult because the surface layer is cobbly.

This soil is used mainly as range and watersheds, but a few small areas are used for orchards in which cherries, peaches, and apricots are grown. Range is a better use than orchards. (Capability unit VIs–1; Upland Gravelly Loam range site)

Kilburn gravelly sandy loam, deep over clean sands, 0 to 3 percent slopes (KmA).—This soil occurs on smooth or slightly convex, slightly undulating stream terraces and deltas of the Weber River. This soil occurs mainly with Kilburn sandy loam and Francis loamy fine sand.

A representative profile:

0 to 15 inches, very dark grayish-brown gravelly sandy loam; friable; granular structure; neutral or mildly alkaline.

15 to 35 inches, brown to dark-brown very gravelly and cobbly sandy loam; friable; subangular blocky structure; neutral.

35 inches +, dark-brown sand mixed with pebbles and cobbles; loose; single grain; neutral.

The surface layer ranges from about 13 to 18 inches in thickness. From 25 to 40 percent of the surface layer, by volume, is gravel. Below a depth of 20 inches, the soil mass is 50 to 80 percent coarse fragments. Depth to clean sand and gravel ranges from 25 to 45 inches.

Included with this soil in mapping were areas of gravelly sandy loam to gravelly very fine sandy loam. Also included were small areas of nongravelly soils and a few areas of cobbly soils.

This soil absorbs moisture readily and is somewhat excessively drained. Permeability is moderately rapid or rapid. The available water capacity is about 1 inch per foot of soil in the upper 2 feet. Below this depth, however, the sandy, gravelly, and cobbly soil material holds only about 0.5 inch of available water per foot, or about 3 to 3.5 inches of available water to a depth of 5 feet. The average depth of root penetration is about 2 to 3.5 feet. Runoff is slow, and the hazard of erosion is none to slight. Natural fertility is moderately low, and tillage is moderately difficult.

This soil is used mainly as range, for irrigated improved pasture, and for irrigated crops. The main crops are orchard fruits, alfalfa, and small grains. About 25 percent of the acreage is used for community developments, which are increasing rapidly. Efficient use of irrigation water is important in managing this droughty soil. (Capability unit IVs–1; Upland Gravelly Loam range site)

Kilburn gravelly sandy loam, deep over clean sands, 3 to 10 percent slopes (KmC).—This soil occurs on gently undulating to moderately sloping stream terraces and deltas. Nearby are other Kilburn soils and areas of Francis loamy sand. This soil is more sloping than Kilburn gravelly sandy loam, deep over clean sands, 0 to 3 percent slopes, and more susceptible to erosion.

The surface layer is 11 to 15 inches thick. The subsoil and substratum are slightly more cobbly and gravelly than those of the Kilburn gravelly sandy loam, 6 to 10 percent slopes.

Included with this soil in the mapping were small areas of gravelly loam that has slopes of less than 3 percent and a few areas that have a cobbly surface layer.

Drainage is somewhat excessive. Runoff is medium, and the hazard of erosion commonly is moderate.

This soil is used as range and for irrigated crops. It is suited to cherry, apricot, and peach orchards and to improved pasture. Important in managing this droughty soil is using irrigation water efficiently. Sprinklers permit the most efficient use. (Capability unit IVs–2; Upland Gravelly Loam range site)

Kilburn sandy loam, 0 to 1 percent slopes (KbA).—This soil occurs on smooth, nearly level stream terraces and deltas of the Weber River. The surface layer is relatively free of gravel and ranges from about 15 inches to 20 inches in thickness; otherwise, this soil is similar to Kilburn gravelly sandy loam, deep over clean sands, 0 to 3 percent slopes.

Included with this soil in mapping were areas of fine sandy loam to light loam. Also included were a few small areas of deep loamy fine sand and of gravelly sandy loam.

This soil is well drained and rapidly permeable. The available water capacity is about 1.2 inches per foot of soil in the upper 2 feet and about 0.5 to 0.7 inch per foot in the gravelly and cobbly materials below a depth of 2 feet. The total available water capacity to a 5-foot depth is about 3.5 to 4.0 inch. Natural fertility is moderate. Runoff is slow. The hazard of water erosion is none to slight, but the hazard of soil blowing is slight to moderate. This soil is friable and easily tilled.

Most of the acreage is used for cultivated crops, but some is used in community developments. This soil is well suited to cherry, apricot, and peach orchards, to irrigated improved pasture, and to alfalfa and small grains. Sprinklers permit the most efficient use of irrigation water. (Capability unit IIIs–1; not used for range)

Kilburn sandy loam, 1 to 3 percent slopes (KbB).—This soil is inextensive in the survey area. It is gently sloping and occurs on deltas and stream terraces along the Weber River. It occurs mainly with other Kilburn soils and Francis loamy fine sand, 0 to 3 percent slopes. It is similar to Kilburn gravelly sandy loam, deep over clean sands, 0 to 3 percent slopes, but the surface layer is relatively free of gravel. The surface layer commonly ranges from 14 to 18 inches in thickness.

Included with this soil in the mapping were small areas that have a gravelly sandy loam surface layer and some areas of deep loamy fine sand and very fine sandy loam.

Most of this soil is used for cultivated crops and improved pasture, for which the soil is well suited. Some areas are used for community developments. The principal crops are cherries, apricots, peaches, alfalfa, and small grains. Efficient use of irrigation water is important in managing this droughty soil. (Capability unit IIIs–2; not used for range)

Kilburn sandy loam, 3 to 6 percent slopes (KbC).—This moderately sloping soil is inextensive. Except for steeper slopes, it is similar to Kilburn sandy loam, 1 to 3 percent slopes. It is also similar to Kilburn gravelly sandy loam, deep over clean sands, 0 to 3 percent slopes, but its surface layer is relatively free of gravel. The surface layer commonly ranges from 12 to 16 inches in thickness.

Included with this soil in mapping were a few small areas of deep loamy fine sand and very fine sandy loam and some areas that have a gravelly surface layer.

This soil is well drained. Runoff is medium, and the hazard of erosion is moderate.

Most of this soil is used for irrigated crops. The principal crops are cherries, peaches, and apricots, which are well suited. Sprinkler irrigation is a good method of applying irrigation water, for it causes less erosion than other methods. (Capability unit IIIs–3; not used for range)

Kilburn stony sandy loam, 0 to 3 percent slopes (KcA).—This soil is dominantly on nearly level, gently undulating, or gently sloping river terraces near the mouth of Weber Canyon. It is stony throughout, but otherwise is similar to Kilburn gravelly sandy loam, deep over clean sands, 0 to 3 percent slopes. This soil formed in materials coarser than those in which other Kilburn soils formed. The surface layer ranges from 11 to 16 inches in thickness.

Included with this soil in mapping were small areas of cobbly sandy loam and gravelly sandy loam and some

areas that have slopes steeper than 3 percent. Also included were several gravel pits that provide commercial gravel and sand.

This soil is very rapidly permeable and is excessively drained. Runoff is slow to medium, and the hazard of erosion is slight to moderate.

This soil is not suited to cultivated crops. It is used mainly as range, for which it is suited. (Capability unit VIs–1; Upland Gravelly Loam range site)

Kilburn-Francis association, 10 to 20 percent slopes, eroded (KFE2).—This soil association occurs on the foot slopes of the Wasatch Mountains. About 75 percent of the association is Kilburn gravelly sandy loam, 10 to 20 percent slopes, eroded, and about 25 percent is Francis loamy fine sand, 10 to 20 percent slopes, eroded. Each of these soils is described under its respective series.

Included in areas mapped as this association are small areas that have a stony surface layer.

Runoff is medium, and the hazard of erosion is moderate to high.

The soils in this association are used mostly as range and for watersheds. They are generally above the highest irrigation canals, but they are suitable for cherry, apricot, and peach orchards if irrigation water is provided. (Both soils in capability unit IVs–3; Kilburn soil in Upland Gravelly Loam range site; Francis soil in Upland Sand range site)

Kilburn-Francis association, 20 to 30 percent slopes, eroded (KFF2).—This association consists of soils on high, moderately steep alluvial fans along the base of the Wasatch Mountains. About 75 percent of the association is Kilburn soils that have a surface layer of gravelly sandy loam and slopes of 20 to 30 percent; about 25 percent is Francis loamy fine sand, 20 to 30 percent slopes, eroded. The differences between these soils are not great enough to justify mapping the soils as separate units. Except for steeper slopes, the soils in this association are similar to soils of the Kilburn-Francis association, 10 to 20 percent slopes, eroded.

Included in areas mapped as this association are small areas of Rock outcrop and some areas that have a stony or very stony surface layer.

Runoff in this association is moderately rapid, and the hazard of erosion is high.

The soils in this association are suitable as watersheds or as range, but permanent cover is needed to control erosion. (Both soils are in capability unit VIs–1; Kilburn soil is in Upland Gravelly Loam range site; Francis soil is in Upland Sand range site)

Kilburn-Francis association, 30 to 50 percent slopes, eroded (KFG2).—The soils of this association are on very steep alluvial fans along the base of the Wasatch Mountains. Except for steeper slopes and a higher hazard of erosion, the soils in this association are similar to those in Kilburn-Francis association, 10 to 20 percent slopes, eroded. Also similar are the percentages of the Kilburn and of the Francis soils.

Included in areas mapped as this association are small areas of stony loam and a few areas of Rock outcrop.

All areas of this association are used for watersheds, range, and wildlife habitats, for which they are suited. Permanent cover is needed to control erosion. (Both soils are in capability unit VIIs–1; Kilburn soil is in Upland Gravelly Loam range site; Francis soil is in Upland Sand range site)

Kirkham Series

The Kirkham series consists of deep, somewhat poorly drained, medium-textured and moderately fine textured soils. These soils are nearly level and occur on flood plains in the northwestern part of the survey area. They formed in mixed alluvium. Elevations range from 4,210 to 4,500 feet above sea level.

The surface layer is very dark grayish-brown, firm silty clay loam or loam 7 to 18 inches thick. The subsoil and substratum are similar to the surface layer, but their color becomes somewhat lighter as depth increases. Textural stratification is common in the substratum.

Kirkham soils commonly are near the Sunset soils and, in places, are near the Airport soils. The native vegetation is mainly saltgrass, wiregrass, greasewood, and povertyweed.

The Kirkham soils are used mainly for irrigated crops and for pasture.

Kirkham silty clay loam (Ks).—This soil is on the lower part of the flood plain of the Weber River. It is smooth or gently undulating and has slopes of less than 1 percent.

A representative profile:

0 to 13 inches, very dark grayish-brown silty clay loam; firm; granular structure; moderately calcareous; mildly alkaline.
13 to 34 inches, dark-brown silty clay loam; firm; massive; moderately calcareous; moderately alkaline.
34 to 68 inches, brown or dark-brown silt loam and fine sandy loam; friable; massive; common distinct mottles; moderately calcareous; moderately alkaline.

The surface layer is about 7 to 15 inches thick. This soil cracks when it dries. The cracks are ½ inch to 2 inches wide and as much as 18 inches deep. Below a depth of 30 inches the texture ranges mainly from silty clay loam to fine sandy loam. Depth to the water table fluctuates seasonally and is highest during periods when the soil is irrigated. Distinct mottles are common below a depth of 24 inches.

Included with this soil in the mapping were small areas of Sunset loam. Also included were small areas that were moderately affected by salts and alkali and a small area that has gravel and sand below a depth of 36 inches.

This soil is somewhat poorly drained and has moderately slow permeability. It holds about 2 inches of available water per foot of soil, or about 10 inches to a depth of 5 feet. Roots penetrate to the water table. Natural fertility is moderately high. Runoff is slow, and the hazard of erosion is slight. Tillage is difficult, and the seedbed must be prepared carefully.

Most of this soil is drained and is used mainly for irrigated crops. About 15 percent is used for native pasture. Alfalfa, corn, tomatoes, sugarbeets, and small grains are the main crops, but some fields are used for improved pasture. Where it is drained, this soil is well suited to these crops and to improved pasture. (Capability unit IIw–1; Semiwet Meadow range site)

Kirkham silty clay loam, strongly alkali (Kt).—This nearly level soil is on the lower part of smooth or gently

undulating flood plains of the Weber River. It is next to Refuge and Wayment soils. This soil is similar to Kirkham silty clay loam, but it is slightly lower in the landscape, is slowly permeable, and is strongly affected by alkali. Depth to the water table generally is 20 to 40 inches. The surface layer commonly ranges from 7 to 12 inches in thickness.

Included with this soil in mapping were small areas of silty clay loam that were very strongly affected by salts and alkali and other areas that were only moderately affected. Also included were areas that range from clay loam to loam and a few spots of silty clay.

This soil is slowly permeable and is somewhat poorly drained. Natural fertility is moderate. Unless it is drained, this soil is not suitable for cultivation.

This soil is used mainly for unimproved pasture. Some areas that have been drained are used for irrigated crops. Areas that are drained and reclaimed from damage by salts and alkali are well suited to irrigated crops of grass-legume hay and irrigated pasture and to small grains, and corn. (Capability unit IVw–3; Alkali Bottom range site)

Kirkham loam (Kr).—This soil is on the lower part of the flood plain of the Weber River. It occurs near Sunset loam. Except that it has a loam surface layer and does not crack when it dries, Kirkham loam is similar to Kirkham silty clay loam. The surface layer commonly ranges from 8 to 18 inches in thickness. The subsoil and substratum are slightly to moderately affected by salts and alkali.

Included with this soil in the mapping were small areas that are somewhat poorly drained and areas of silty clay loam.

Typically, this soil is moderately well drained, but in most areas drainage has been improved. Runoff is slow, and the hazard of erosion is slight. Because this soil is friable, tillage is easy.

This soil is used as range and for irrigated crops. Where it is adequately drained, it is well suited to irrigated alfalfa, corn, sugarbeets, and small grains and to irrigated improved pasture. (Capability unit IIw–3; Semiwet Meadow range site)

Kirkham-Airport silty clay loams (KX).—This complex occurs on flood plains of the Weber River, mainly about 1 mile north of West Weber. About 65 percent of this complex is Kirkham silty clay loam, strongly alkali, and 35 percent is Airport silty clay loam. These soils are nearly level to gently undulating. They are moderately to strongly affected by salts and alkali. The Kirkham soil is in slight depressions, and the Airport soil is mainly on slight knolls or ridges. In places, however, differences in the relief of these soils cannot be seen. The Kirkham soil is similar to Kirkham silty clay loam, strongly alkali, but has a water table generally at a depth of 20 to 40 inches. The Airport soil is similar to the Airport silty clay loam described under the Airport series, but it has a slightly darker surface layer and a subsoil with weaker structure.

Included with this complex in mapping were small areas of silty clay loam that were very strongly affected by salts and alkali.

Runoff is slow, and the hazard of erosion is slight.

Almost all the acreage of these soils is used as range, but a few spots are cultivated. Drained and reclaimed areas are well suited to irrigated improved pasture and to an occasional crop of irrigated small grain or corn. (Capability unit IVw–3; Alkali Bottom range site)

Lakeshore Series

The Lakeshore series consists of deep, poorly drained and very poorly drained, salty soils. These soils are on flat or nearly level low lake plains and on smooth, nearly level areas adjoining ponds. They formed in medium-textured, reworked sediments. Elevations range from 4,200 to 4,400 feet above sea level.

The surface layer is grayish-brown, friable silt loam 2 to 5 inches thick. The subsoil and substratum are olive, friable silt loam, fine sandy loam, or loam. Throughout the profile the content of soluble salts is high.

Lakeshore soils are commonly near the Saltair, Warm Springs, and Leland soils. In some areas salts crust the surface, and about 90 percent of this acreage is barren. Over much of the acreage, however, there is no salt crust, and the native vegetation is scattered saltgrass, pickleweed, and inkweed.

Except for limited grazing, Lakeshore soils have little use as farmland. Large areas of these soils are barren.

Lakeshore silt loam (La).—This soil is smooth or gently undulating. It occurs on low lake plains in the western part of the survey area. It is near the Saltair soils. Slopes are less than 1 percent.

A representative profile:

0 to 4 inches, grayish-brown silt loam; friable; platy structure; strongly calcareous; moderately alkaline; salt crust about one-eighth of an inch thick on the surface.
4 to 19 inches, olive and light olive-brown, stratified silt loam, very fine sandy loam, and loam; friable; massive; common distinct mottles; moderately to strongly calcareous; moderately or mildly alkaline.
19 to 51 inches, olive silt loam; friable; massive; common distinct mottles; moderately calcareous; mildly alkaline.

The surface of this soil is generally crusted with salts, dominantly sodium chloride, and there is a high concentration of salts throughout the profile. Very few roots grow in the surface layer. The water table is at or near the surface most of the time.

Included with this soil in the mapping were small areas of silty clay loam and of fine sandy loam.

This soil is poorly drained and slowly permeable. Runoff is very slow and in many places is ponded. The hazard of erosion is none to slight.

This soil has little or no value for farming. Large areas are barren, but they have some value as wildlife habitat. (Capability unit VIIIw–1; not suited to range)

Lakeshore fine sandy loam (Lb).—This soil is in slight depressions on low lake terraces mainly in the general vicinity of West Warren in Weber County. It occurs with the Leland and Warm Springs soils.

The surface layer is fine sandy loam about 3 to 6 inches thick. The content of salts throughout the profile is high, though salts do not crust the surface as they do that of Lakeshore silt loam.

Included with this soil in mapping were some small areas of silt loam. This soil is very poorly drained and has slow permeability. Natural fertility is moderately low.

All of this soil is used as range, but the yields of herbage are very low. Because it is in low positions where drainage outlets are few, this soil is difficult to drain and reclaim. (Capability unit VIIw–1; Alkali Bottom range site)

Layton Series

The Layton series consists of deep, well drained and moderately well drained, coarse-textured soils. These soils are on smooth, nearly level to strongly sloping lake terraces of medium height. They formed in coarse-textured sediments that have been reworked by wind. Elevations range from about 4,300 to 5,100 feet above sea level.

The surface layer is very dark grayish-brown or very dark brown, very friable loamy fine sand 10 to 18 inches thick. The subsoil is dark-brown to brown, friable, subangular blocky loamy fine sand. The substratum is brown, friable to loose fine sand or loamy fine sand containing lime that has been carried down from the surface soil and subsoil.

Layton soils are mainly near the Francis, Kidman, and Timpanogos soils. The native vegetation consists dominantly of brushy Gambel oak, bunch grasses, sagebrush, and rabbitbrush.

The Layton soils are used mainly for irrigated farming.

Layton loamy fine sand, 0 to 3 percent slopes (LcB).—This soil is smooth or gently undulating. It occurs on broad lake terraces, mainly near the central or north-central parts of the survey area near Kidman fine sandy loam. Slopes are generally less than 1 percent.

A representative profile:

0 to 15 inches, very dark grayish-brown loamy fine sand; friable; granular structure; noncalcareous; mildly alkaline.
15 to 29 inches, dark-brown to brown loamy fine sand; friable; subangular blocky structure; noncalcareous to slightly calcareous; moderately alkaline.
29 to 66 inches, brown loamy fine sand; friable; massive; moderately calcareous; strongly alkaline.

The surface layer ranges from 13 to 18 inches in thickness. In most areas the water table fluctuates between a depth of 40 and 60 inches part of the year. In some places on the higher terraces, however, the water table is below a depth of 60 inches. This soil is strongly alkaline below a depth of 30 inches in some places, but it is free of harmful salts or alkali.

Included with this soil in the mapping were small areas of fine sandy loam and of sandy loam. Also included were small areas of loamy fine sand that have slopes slightly more than 3 percent.

This soil is moderately well drained and well drained and is rapidly permeable. It holds about 1.2 inches of available water per foot of soil, or about 6 to 7 inches to a depth of 5 feet. Roots penetrate to a depth of 5 feet or more, but very few roots are below 40 inches. Natural fertility is moderately high. Runoff is slow. Water erosion is a slight hazard, but the hazard of soil blowing is moderate where the soil is left bare during winter.

Most of this soil is used for irrigated crops; less than 10 percent is used as range. The irrigated crops are mainly alfalfa, corn, tomatoes, sugarbeets, potatoes, small grains, peaches, apricots, and cherries, for which this soil is well suited. Improved pasture is alternated with crops. Sprinklers permit the most efficient use of irrigation water. (Capability unit IIs–2; not used for range)

Layton loamy fine sand, 3 to 6 percent slopes (LcC).—This inextensive soil is on moderately sloping terrace escarpments. It is next to Layton loamy fine sand, 0 to 3 percent slopes, and is similar to that soil but is more sloping. The surface layer is 10 to 14 inches thick. Erosion is a moderate hazard.

Included with this soil in the mapping were a few small areas of loamy fine sand that have slopes of less than 3 percent.

This soil is used for irrigated crops and for pasture. The main crops are alfalfa and small grains. This soil is well suited to irrigated improved pasture or grass-legume hay. Sprinklers permit the most efficient use of irrigation water. (Capability unit IIIs–3; not used for range)

Layton loamy fine sand, 6 to 10 percent slopes (LcD).—This inextensive soil is on strongly sloping terrace escarpments. It is next to Layton loamy fine sand, 3 to 6 percent slopes, and is similar to that soil but is more sloping. The surface layer is 10 to 14 inches thick. Runoff is moderate, and the hazard of erosion is high.

This soil is used mainly as range and for dryfarming. It is fairly well suited to irrigated crops and to irrigated improved pasture. This soil is well suited to grass-legume hay and to cherries, apricots, and peaches. Sprinkler irrigation permits the most efficient use of water and is less likely to cause erosion than other methods. (Capability unit IVs–2; Upland Sand range site)

Layton loamy fine sand, duned, 1 to 3 percent slopes (LdB).—This soil occurs in areas that have been severely reworked by wind. Relief varies abruptly because of the dunes that range from about 3 to 6 feet in height. Except for dunes on the surface, this soil is similar to Layton loamy fine sand, 0 to 3 percent slopes. The surface layer is about 10 to 18 inches thick.

Included with this soil in the mapping were some areas of fine sandy loam.

This soil is used mainly for community and industrial developments. It can be used for irrigated farming. Sprinkler irrigation is generally essential because land leveling is not practical, this soil is sandy, and the hazard of soil blowing in cultivated fields is high. (Capability unit IVs–4; not used for range)

Leland Series

The Leland series consists of deep, somewhat poorly drained and moderately well drained, saline-alkali soils. These soils are on nearly level low lake terraces. They formed in moderately fine textured lake sediments. Elevations range from about 4,220 to 4,500 feet above sea level.

The surface layer is dark grayish-brown, friable silt loam 4 to 8 inches thick. The subsoil is brown, very firm, columnar clay loam or light clay 7 to 20 inches thick. The substratum is brown, massive very fine sandy loam to clay loam.

Leland soils are commonly near the Warm Springs, Syracuse, Harrisville, Airport, Croy, and Saltair soils. The native vegetation is mainly saltgrass, alkali sacaton, foxtail barley, pepperweed, and greasewood.

Leland soils are used mainly as range. In a few small areas, part of the salts and alkali has been removed, and the soils are used for those irrigated crops that tolerate alkali.

Leland silt loam (Le).—This nearly level soil is on broad, smooth to undulating low lake terraces, mainly near West Warren. These lake terraces are slightly higher than the lake plain.

A representative profile:

0 to 8 inches, dark grayish-brown, friable silt loam; platy structure; noncalcareous and moderately alkaline.
8 to 19 inches, brown, very firm clay loam; columnar structure; strongly calcareous; very strongly alkaline.
19 to 38 inches, brown, friable to firm sandy clay loam that is highly stratified with very fine sandy loam and silt loam and contains very thin lenses of clay loam; massive; distinct mottles; moderately calcareous; very strongly alkaline.
38 to 58 inches, brown, very friable very fine sandy loam; massive; moderately calcareous; very strongly alkaline.

This soil is strongly affected throughout by alkali and moderately or strongly affected by salts. It is more strongly affected in the subsoil. Depth to the water table ranges from about 48 to 60 inches. Distinct mottles are common below a depth of 24 inches.

Included with this soil in mapping were small areas of fine sandy loam and some areas of very salty soils. Also included were small hummocky areas of windblown materials.

This soil is moderately well drained to somewhat poorly drained and is slowly or very slowly permeable. The available water capacity is about 1.2 inches per foot of soil, or about 5 to 6 inches to a depth of 5 feet. Most roots are in the surface layer. In many places there is a distinct mat of roots on top of the columnar subsoil, but few roots penetrate the subsoil. Natural fertility is low. Runoff is slow, and the hazard of erosion is slight.

Because it is strongly affected by salts and alkali, this soil is not suitable for cultivation. In a few small cultivated areas part of the salts and alkali has been removed, but yields are very low. Most of this soil is used as range, for which it is well suited. (Capability unit VIw–1; Alkali Bottom range site)

Leland-Saltair complex (LS).—The soils in this complex are on broad, slightly undulating low lake terraces that are slightly higher than the lake plain. These soils are in the northwestern part of the survey area. Leland silt loam makes up about 65 percent of the complex; Saltair silty clay loam, 30 percent; and other soils, 5 percent. Other soils are mainly silt loams and are on hummocks about 3 feet high. The Saltair soil is in very slight depressions, and the Leland soil is on slightly elevated ridges. Their difference in elevation is not more than 12 inches in most places. The profile of Leland soil in this complex is similar to that of Leland silt loam described under the Leland series. A profile of Saltair silty clay loam is described under the Saltair series.

The soils in this complex are not suitable for cultivation. They are suited as range, for which they are used. (Leland soils are in capability unit VIIw–1 and Alkali Bottom range site; Saltair soils are in capability unit VIIIw–1 but are not suited to range)

Leland-Harrisville silt loams, 0 to 1 percent slopes (LHA).—The soils in this complex are slightly undulating and occur on low lake terraces. The complex occurs in two general areas. One is in the extreme north-central part of the survey area; the other is east of Hooper and extends southward. Leland silt loam makes up about 60 percent of the complex, and Harrisville silt loam makes up about 40 percent. Typically, the Harrisville soil is on slight knolls or mounds, and the Leland soil is in slight depressions or drainageways. Except for a finer textured substratum, the Leland soil in this complex is similar to Leland silt loam described under the Leland series. The Harrisville soil is similar to Harrisville silt loam, 0 to 1 percent slopes, which is described under the Harrisville series.

Included with this complex in the mapping were some small areas of silty clay loam.

The soils of this complex are used mainly as range, but a small acreage is used for irrigated farming. Because it is poorly drained and has a high content of alkali, the Leland soil is poorly suited to crops. (Leland soil is in capability unit VIw–1 and Alkali Bottom range site; Harrisville soil is in capability unit IIIw–4 and Semiwet Meadow range site)

Leland-Airport-Croy complex (LP).—This complex consists of soils in fairly broad depressions on a low lake terrace in the central part of the survey area near the Davis-Weber County line. These soils are moderately to strongly affected by salts and alkali. About 45 percent of this complex is Leland silt loam, 30 percent is Airport silty clay loam, 20 percent is Croy loam, and 5 percent is other soils. The other soils are salty silty clay loams. The Leland soil in this complex is similar to Leland silt loam described under the Leland series. The Airport soil is similar to Airport silty clay loam, and the Croy soil is similar to Croy loam. These soils are described under their respective series. Depth to the water table ranges from 30 to 40 inches.

All the acreage of this complex is used as unimproved pasture. Unless these soils are drained and reclaimed from damage by salts and alkali, they are not suited to crops. Drainage and reclamation are difficult because the soils are low and drainage outlets are lacking. (Leland and Croy soils are in capability unit VIw–1; Airport soil is in capability unit IVw–3; all three soils are in Alkali Bottom range site)

Logan Series

The Logan series consists of deep, poorly drained and very poorly drained, black or nearly black soils. These soils are on nearly level low lake terraces and flood plains where the water table has been continuously high. They formed in moderately fine textured alluvium and lake sediments. Elevations range from 4,220 to 4,650 feet above sea level.

The surface layer is black, friable silty clay loam 10 to 16 inches thick. The subsoil is olive-gray, firm silty clay loam. The substratum ranges from fine sand to silty clay. The Logan soils are calcareous throughout their profile and have a layer in which lime has accumulated, generally within 16 inches from the surface.

Logan soils are commonly near the Ironton, Roshe Springs, Cudahy, and Woods Cross soils. The native vegetation is saltgrass, Kentucky bluegrass, wiregrass, and sedges.

Logan soils are used mainly for native pasture and hay. Some areas that have been drained and reclaimed from damage by salts and alkali are used for irrigated crops.

Logan silty clay loam (Lt).—This soil is on smooth depressions on low lake terraces and flood plains. It occurs in the northern part of the survey area north and northwest of Ogden and in the southwestern part west of Centerville and Bountiful. Slopes range from 1 to 3 percent but are dominantly less than 1 percent.

A representative profile:

0 to 12 inches, black silty clay loam; friable; granular structure; strongly calcareous; moderately alkaline.
12 to 29 inches, olive-gray silty clay loam; firm; subangular blocky structure; strongly calcareous; moderately alkaline.
29 to 46 inches, light brownish-gray silt loam; firm; massive; distinct mottles; strongly calcareous; moderately alkaline.
46 to 60 inches, olive, stratified fine sand, fine sandy loam, and silty clay; firm; distinct mottles; strongly calcareous; moderately alkaline.

The surface layer ranges from about 10 to 18 inches in thickness and has a high content of organic matter. Depth to the water table ranges from about 18 to 40 inches. Some areas of this soil have been drained.

Included with this soil in the mapping were small areas of organic soils that have a layer of peat, as much as 5 inches thick, on the surface. Also included were small areas that range from clay loam to silt loam. Some inclusions have a moderately permeable substratum, and some are slightly affected by salts and alkali.

This soil is poorly drained and is slowly or very slowly permeable. It holds about 2.2 inches of available water per foot of soil, or about 10 to 11 inches to a depth of 5 feet. Roots generally penetrate to the water table. Runoff is slow, and the hazard of erosion is slight. Tillage is moderately difficult.

This soil is used mainly for hay and unimproved pasture. About 25 percent of the acreage is drained and used for irrigated crops, mainly corn, small grains, sugarbeets, and truck crops. This soil is suited to cultivated crops only if it is drained. Drained areas are also suited to irrigated improved pasture. (Capability unit IIIw–2; Wet Meadow range site)

Logan silty clay loam, moderately alkali (Lu).—This soil is mainly in narrow, nearly level drainageways adjacent to Fourmile Creek northwest of Slaterville in the northern part of the survey area. Except that it is moderately affected by salts and alkali, this soil is similar to Logan silty clay loam. The surface layer is 10 to 14 inches thick. Depth to the water table ranges from 20 to 30 inches.

All of this soil is used for unimproved pasture. Unless it is drained and reclaimed from damage by salts and alkali, this soil is not suited to cultivated crops. Drainage is difficult because the soil is in low positions where drainage outlets are few. (Capability unit IVw–1; Salt Meadow range site)

Logan silty clay loam, shallow water table (Lw).—This soil is in nearly level low drainageways where the water table is continuously near the surface. It generally occurs in long, narrow or irregularly shaped areas with the Ironton or Roshe Springs soils. Except that it has a water table within a depth of 18 inches most of the time, this soil is similar to Logan silty clay loam. Typically, the surface layer is 10 to 16 inches thick.

Included with this soil in the mapping were small areas of silt loam and some areas of organic soils that have a layer of peat, 1 to 5 inches thick, on the surface.

This soil is used for unimproved pasture. It is poorly suited to cultivated crops because it is difficult to drain. Drained areas are suited to irrigated improved pasture and to some kinds of truck crops. (Capability unit IVw–1; Wet Meadow range site)

Made Land

Made land (Ma) consists mainly of areas that have been filled with various kinds of soil material and smoothed. The soil materials are largely from the Timpanogos, Hillfield, and Kidman soils. Made land occurs mainly on the Hill Air Force Base and is used for parking lots, storage lots, and building sites. (Capability unit and range site not assigned)

Marriott Series

The Marriott series consists of deep, somewhat excessively drained, gravelly and cobbly soils that are mainly on moderately steep to very steep south- and east-facing escarpments of deltas and streams. These soils formed in gravelly, moderately coarse textured delta deposits that were derived from many kinds of rocks. Elevations range from 4,300 to 4,900 feet above sea level.

The surface layer is very dark brown to dark-brown, friable gravelly or cobbly sandy loam 4 to 8 inches thick. The subsoil and substratum become lighter colored with increasing depth but otherwise are similar to the surface layer.

Marriott soils are commonly near the Kilburn, Hillfield, and Preston soils. The native vegetation consists mainly of sand dropseed, Indian ricegrass, three-awn, cheatgrass brome, and sagebrush.

Marriott soils are used mainly as range, but a small acreage is used for irrigated orchards.

Marriott cobbly sandy loam, 10 to 30 percent slopes, eroded (MeE2).—This inextensive, strongly sloping to steep soil occurs on terraces and on delta escarpments in the east-central part of the survey area.

A representative profile:

0 to 8 inches, dark-brown cobbly sandy loam; friable; granular and subangular blocky structure; noncalcareous; mildly alkaline.
8 to 22 inches, dark-brown to brown cobbly fine sandy loam; friable; subangular blocky structure; noncalcareous to a depth of 12 or 13 inches, slightly calcareous below 13 inches; mildly alkaline.
22 to 61 inches, brown cobbly fine sandy loam; friable; massive; moderately calcareous; mildly alkaline.

The surface layer is cobbly sandy loam about 8 inches thick. By volume, pebbles and cobbles make up about 15 to 40 percent of the surface layer and about 10 to 45 percent of the subsoil and substratum. In places the surface layer is slightly calcareous.

Included with this soil in the mapping were small areas of deep, nongravelly fine sand and some areas of gravelly loamy fine sand.

This soil is somewhat excessively drained and has moderately rapid to rapid permeability. It holds about 0.7 to 1.2 inches of available water per foot of soil, or about 3.5 to 5 inches to a depth of 5 feet. Roots penetrate to a depth of 5 feet or more. Natural fertility is moderately low. Runoff is medium, and the hazard of erosion is moderate. Because this soil is gravelly, tillage is somewhat difficult.

This soil is used mainly as range, for which it is suited. Only about 10 percent of the total acreage, areas where slopes are less than 20 percent, has been cultivated. Cultivated areas are used for irrigated cherry, apricot, and peach orchards. (Capability unit VIs–1; Upland Gravelly Loam range site)

Marriott Series, Calcareous Variants

The calcareous variants from normal Marriott soils are deep, well drained, and gravelly. These variants are strongly sloping to moderately steep, and they occur on alluvial and colluvial fans on high lake terraces in the northeastern part of the survey area. They formed in gravelly calcareous alluvium and colluvium.

The surface layer is very dark grayish-brown, friable gravelly sandy loam about 11 to 19 inches thick. The subsoil is dark-brown, friable gravelly sandy loam. The substratum is similar to the subsoil but is somewhat lighter colored.

These calcareous variants are near the Pleasant View, Ridd, and Sterling soils. The native vegetation is bunch grasses, big sagebrush, and cheatgrass brome.

These variants from the normal Marriott soils are used for irrigated orchards and as range.

Marriott gravelly sandy loam, calcareous variant, 10 to 20 percent slopes, eroded (MgE2).—This gently rolling to hilly soil occurs on the higher parts of slightly convex colluvial and alluvial fans north of Pleasant View, in Weber County.

A representative profile:

0 to 18 inches, very dark grayish-brown gravelly sandy loam; friable; granular structure; strongly calcareous; moderately alkaline.

18 to 33 inches, dark-brown to brown gravelly sandy loam; friable; subangular blocky structure in the upper 7 inches and massive below; strongly calcareous; moderately alkaline.

33 to 60 inches, grayish-brown gravelly sandy loam; friable; massive; strongly calcareous; moderately alkaline.

The surface layer ranges from 11 to 19 inches in thickness. By volume, gravel makes up from about 20 to 45 percent of the surface layer. Pebbles and cobbles make up about 20 to 60 percent of the subsoil.

Included with this soil in the mapping were areas that have a moderately cobbly surface layer and some areas that are gullied. Also included are small areas of gravelly loam that have slopes of 6 to 10 percent.

This soil is well drained and is rapidly permeable. It holds about 0.7 to 1 inch of available water per foot of soil, or about 3.5 to 5 inches to a depth of 5 feet. Roots penetrate to a depth of more than 3 feet. Natural fertility is moderate. Runoff is medium to rapid, depending on steepness of slopes and the kind and amount of vegetation. The hazard of erosion is high. Tillage is moderately difficult.

This soil is used mainly as range and for irrigated peach, apricot, and cherry orchards. It is well suited to those uses and to improved pasture. Sprinkler irrigation permits the most efficient use of water and is less likely to cause erosion than other methods. (Capability unit IVs–3; Upland Gravelly Loam range site)

Marriott gravelly sandy loam, calcareous variant, 6 to 10 percent slopes (MgD).—This strongly sloping soil is on alluvial and colluvial fans near the base of the Wasatch Mountains in the northeastern part of the survey area. Except that it is less sloping, this soil is similar to Marriott gravelly sandy loam, calcareous variant, 10 to 20 percent slopes, eroded. The surface layer is 15 to 19 inches thick.

Included with this soil in the mapping were small areas that have a cobbly surface layer and a few areas of gravelly sandy loam that have slopes of 10 to 20 percent.

Runoff is medium, and the hazard of erosion is moderate.

This soil is used mainly as range, but less sloping areas are cultivated. It is suitable for irrigated peach, apricot, and cherry orchards and for irrigated improved pasture. Sprinkler irrigation permits the most efficient use of water and is less likely to cause erosion than other methods. (Capability unit IVs–2; Upland Gravelly Loam range site)

Martini Series

The Martini series consists of deep, moderately well drained, highly stratified soils. These nearly level soils are on the flood plain of the Weber River in the north-central part of the survey area. They formed in moderately coarse textured, highly stratified alluvium.

The surface layer is very dark grayish-brown or dark-brown, very friable fine sandy loam 4 to 11 inches thick. The subsoil and substratum are dark-brown or dark grayish-brown fine sandy loam that generally contains layers of fine sand. In places these soils are underlain by gravelly sandy loam below a depth of 36 inches.

Martini soils are near the Sunset and Steed soils. The native vegetation is mainly cottonwood, boxelder, and willow trees and an understory of rose bushes, sagebrush, and bunch grasses.

Martini soils are used mainly for irrigated farming, but some areas are used as range.

Martini fine sandy loam, 0 to 1 percent slopes (MrA).—This soil is moderately extensive. It occurs on smooth nearly level flood plains adjacent to the Weber River, mainly west of Ogden.

A representative profile:

0 to 5 inches, very dark grayish-brown fine sandy loam; very friable; granular structure; moderately calcareous; mildly alkaline.

5 to 19 inches, dark-brown fine sandy loam that contains thin lenses of fine sand; very friable; massive or single grain; moderately calcareous; mildly to moderately alkaline.

19 to 70 inches, dark grayish-brown fine sandy loam that contains thin lenses of fine sand; very friable; massive or single grain; common faint mottles; moderately calcareous; moderately alkaline.

In places the fine sandy loam surface layer is covered by an overwash consisting of 1 to 4 inches of loam or

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very fine sandy loam. The surface layer ranges from about 5 to 11 inches in thickness. In places the substratum is gravelly below a depth of 36 inches. Depth to the water table ranges from about 40 to 60 inches.

Included with this soil in the mapping were small areas of somewhat poorly drained loams and some areas of gravelly sandy loams. Also included were some small areas that have slopes of more than 1 percent and some areas that are slightly affected by salts and alkali.

This soil absorbs moisture readily. It is moderately well drained and is moderately rapidly to rapidly permeable. This soil holds about 1.2 inches of available water per foot of soil, or about 6 inches to a depth of 5 feet. Roots penetrate to a depth of 5 feet or more. Runoff is slow, and the hazard of erosion is slight. Before flood control structures were built, this soil was subject to flooding in places; now flooding is infrequent. This soil is friable and easy to work.

This Martini soil is used mainly for irrigated crops of alfalfa, corn, small grains, potatoes, sugarbeets, and tomatoes. It is well suited to irrigation and to many kinds of crops. The most needed management is land leveling that insures even distribution of irrigation water. (Capability unit IIs–2; not used for range)

Martini fine sandy loam, 0 to 1 percent slopes, channeled (MtA).—This soil occurs on flood plains near or adjacent to the chanel of the Weber River west of Ogden. It is dissected by many old stream channels of variable depth. Differences in elevation generally range from 2 to 4 feet. Except for the channels, this soil is similar to Martini fine sandy loam, 0 to 1 percent slopes.

This soil is used mainly as range, and only a few areas have been cleared and leveled for irrigated farming. Most areas have a cover of cottonwood, boxelder, willow, rose bushes, and bunch grasses. Clearing and leveling are needed before these areas can be used for irrigated crops, but these improvements are costly. In cleared and leveled areas, this soil is well suited to irrigated alfalfa, corn, sugarbeets, small grains, tomatoes, and potatoes. It is also well suited to irrigated improved pasture. (Capability unit IIs–2; Semiwet Meadow range site)

Parleys Series

The Parleys series consists of deep, well-drained, medium-textured soils. These soils are on extensive, nearly level to steep lake terraces, mainly in the central part of the survey area. They formed in mixed lake sediments. Elevations range from about 4,300 to 5,100 feet above sea level.

The surface layer is very dark brown, friable loam 6 to 20 inches thick. The subsoil is dark-brown, firm, prismatic or subangular blocky clay loam. The substratum is brown, firm, massive silt loam or silty clay loam. Lime that has leached from the surface layer and upper subsoil has accumulated in the lower part of the subsoil and in the upper part of the substratum.

Parleys soils are near the Timpanogos, Kidman, Hillfield, and Ackmen soils. The native vegetation is mainly bushy Gambel oak, sagebrush, and bunch grasses.

Parleys soils are used for irrigated farming and dryfarming.

Parleys loam, 0 to 1 percent slopes (PaA).—This is one of the most extensive soils in the survey area. It occurs on broad, smooth or gently undulating lake terraces that are moderately high and high. This soil is near Timpanogos loam.

A representative profile:

0 to 15 inches, very dark brown loam; friable; granular structure to a depth of 6 inches, blocky structure below 6 inches; neutral.
15 to 26 inches, dark-brown clay loam; firm; prismatic structure; neutral.
26 to 33 inches, dark-brown silty clay loam; firm; prismatic structure; strongly calcareous; mildly alkaline.
33 to 60 inches, brown silt loam in upper 15 inches, platy, stratified silty clay loam or silty clay and very fine sandy loam below; firm or friable; massive; strongly calcareous; moderately alkaline.

The surface layer ranges from about 12 to 20 inches in thickness. The structure of the subsoil ranges from prismatic to subangular blocky. In places this soil has a fluctuating water table and has distinct brownish-yellow mottles between a depth of 36 and 60 inches.

Included with this soil in the mapping were small areas that are slightly steeper than 1 percent and areas of silty clay loam, silt loam, and fine sandy loam.

This soil is well drained and has moderately slow permeability. It holds about 2 inches of available water per foot of soil, or about 10 inches to a depth of 5 feet. Roots penetrate to a depth of 5 feet or more. Natural fertility is high. Runoff is slow, and the hazard of erosion is none to slight. This soil is friable, and tillage is easy.

Most of this soil is irrigated and is used for cultivated crops, mainly alfalfa, small grains, corn, tomatoes, and sugarbeets. This soil is well suited to irrigation and to many kinds of crops. The most needed management is land leveling that insures even distribution of irrigation water. (Capability unit I–1; range site not assigned)

Parleys loam, 1 to 3 percent slopes (PaB).—This soil is extensive. Except that it is more sloping, it is similar to Parleys loam, 0 to 1 percent slopes. The surface layer is 12 to 18 inches thick. Runoff is slow, and the hazard of erosion is slight.

Included with this soil in the mapping were some small areas that have slopes of less than 1 percent and some that have slopes of more than 3 percent. Also included were areas of silty clay.

This soil is used mainly for alfalfa, small grains, corn, tomatoes, and sugarbeets. It is well suited to irrigation and to many kinds of crops. Land leveling that helps to distribute irrigation water evenly is the most needed management. (Capability unit IIe–2; not used for range)

Parleys loam, 3 to 6 percent slopes (PaC).—Except that it is more sloping, this soil is similar to Parleys loam, 0 to 1 percent slopes. The surface layer is 12 to 16 inches thick. Runoff is medium, and the hazard of erosion is moderate.

Included with this soil in the mapping were small areas that have a loam subsoil and areas of Parleys loam, 0 to 1 percent slopes.

Parleys loam, 3 to 6 percent slopes, is used for irrigated general farm crops and for orchard fruits. Alfalfa and small grains, are the main irrigated crops, and peaches, apricots, and cherries are the main orchard fruits. (Capability unit IIIe–2; not used for range)

Parleys loam, 6 to 10 percent slopes (PaD).—This soil is on strongly sloping lake-terrace escarpments and

ridges in the east-central part of the survey area. It is similar to Parleys loam, 0 to 1 percent slopes, but has stronger slopes and a surface layer only 10 to 16 inches thick.

Included with this soil in the mapping were a few small areas of deep silt loam and a few small areas of Parleys loam, 3 to 6 percent slopes.

Runoff is medium, and the hazard of erosion is moderate to high. Natural fertility is moderately high.

This soil is used for both irrigated farming and dryfarming. Irrigated crops consist of alfalfa, peaches, cherries, and apricots; dryfarmed crops are winter wheat and alfalfa. This soil is well suited to orchards and to irrigated improved pasture. (Capability unit IIIe–3; not used for range)

Parleys loam, 10 to 20 percent slopes, eroded (PaE2).—This soil is on moderately steep, mainly north-facing lake-terrace escarpments in the east-central part of the survey area. It is similar to Parleys loam, 0 to 1 percent slopes, except that it is steeper, is moderately eroded, and has a surface layer only 7 to 15 inches thick. In places, the strongly calcareous subsoil material has been mixed with the surface layer through tillage.

Included with this soil in the mapping were small areas of deep silt loam.

Runoff is medium to rapid, and the hazard of erosion is high. Natural fertility is moderately high.

This soil is used mainly for dryfarming. Winter wheat and alfalfa are the main crops. If it is irrigated by sprinklers, this soil is well suited to orchards and to improved pasture. (Capability unit IVe–4; Upland Loam range site)

Payson Series

The Payson series consists of deep, somewhat poorly drained and moderately well drained, medium-textured soils. These soils are on nearly level low lake terraces and are affected by salts and alkali. They formed in mixed lake sediments. Elevations range from about 4,200 to 4,600 feet above sea level.

The surface layer is dark grayish-brown, friable silt loam about 2 to 7 inches thick. The subsoil is dark grayish-brown and grayish-brown, firm silty clay loam and clay and has columnar and prismatic structure. The substratum is grayish-brown or olive, firm, massive silt loam or silty clay loam.

Payson soils are commonly near the Airport, Terminal, Warm Springs, Arave, and Saltair soils. In the Davis-Weber Area, Payson soils are mapped only in complexes with the Warm Springs and the Airport soils. The native vegetation is mainly saltgrass, greasewood, and cheatgrass brome.

Payson soils are used only as range.

Payson-Warm Springs complex, 0 to 3 percent slopes (PNA).—This complex is on broad, undulating low lake terraces, mainly in the southwestern part of the survey area. Although slopes range from 0 to 3 percent, they are dominantly less than 1 percent. About 70 percent of this complex is Payson soils, and about 30 percent is Warm Springs soils. The Payson soils are in depressions or swales. The Warm Springs soils, apparently consisting of wind-deposited material, are in small areas on low mounds or ridges. These soils have a fine sandy loam surface layer about 5 to 8 inches thick. They overlie clay at a depth of 20 to 30 inches and are similar to Warm Springs fine sandy loam, deep over clay, 0 to 1 percent slopes.

A representative profile of Payson soils:

0 to 4 inches, dark grayish-brown silt loam; friable; platy structure; neutral.
4 to 9 inches, dark grayish-brown silty clay loam; very firm; strong columnar structure; noncalcareous or slightly calcareous; moderately alkaline.
9 to 24 inches, grayish-brown clay; firm; prismatic structure; strongly calcareous; strongly alkaline.
24 to 30 inches +, olive silt loam; firm; platy structure (laminated); strongly calcareous; very strongly alkaline.

The surface layer of Payson soils ranges from about 1 to 9 inches in thickness. This layer is dominantly silt loam, but ranges from loam to silty clay loam in texture. In places the surface layer is slightly calcareous to strongly calcareous as a result of flooding with water that contains much carbonates.

Included with this complex in the mapping were areas of loam, some small areas of very salty soils, and some areas of silty clay loam that have a lime-cemented hardpan. Also included were some areas that are ponded part of the time.

The soils of this complex are somewhat poorly drained and moderately well drained and are slowly or very slowly permeable. Few roots penetrate the fine-textured subsoil. Runoff is slow. Water erosion is a slight hazard, and soil blowing is a moderate hazard. In most places depth to the water table ranges from about 30 to 48 inches.

All the acreage of this complex is used as range, but vegetation is sparse on most of the Payson soils. The soils in this complex are not suited to cultivated crops. (Both soils are in capability unit VIw–1; both soils are in Alkali Bottom range site)

Payson-Airport silt loams, 0 to 3 percent slopes (PMA).—This extensive complex consists of about equal parts of Payson silt loam and Airport silt loam. These soils occur together in such an intricate pattern that they cannot be shown separately on the soil map. This complex is in the western part of the survey area. It begins about 6 miles west of Kaysville, and narrow, broken strips extend southward to a point about 2 miles west of Bountiful in Davis County. The Payson soil in this complex is similar to the Payson soil described under the Payson-Warm Springs complex, 0 to 3 percent slopes, but has a somewhat darker and thicker surface layer. The Airport silt loam is described under the Airport series. The surface of these nearly level soils is generally smooth and no difference in height is observable. Depth to the water table ranges from 20 to 36 inches.

Included in mapped areas of this complex were a few small areas of deep silt loam that are not affected by alkali and areas of silty clay loam that have a salt crust on the surface.

The soils of this complex are somewhat poorly drained and have very slow permeability. Runoff is slow to ponded, and the hazard of erosion is slight.

This complex is used mainly for unimproved pasture, for which it is suited. (Payson soil is in capability unit VIw–1; Airport soil is in capability unit IIIw–4; both soils are in Alkali Bottom range site)

Pleasant View Series

The Pleasant View series consists of deep, well-drained, gently sloping to moderately steep gravelly soils. These soils are mainly on high alluvium fans in the northeastern part of the survey area. They formed in noncalcareous or slightly calcareous alluvium that was derived from gneiss, schist, shale, and argillite. Elevations range from 4,350 to 4,900 feet above sea level.

The surface layer is very dark grayish-brown or very dark brown, friable loam or gravelly sandy loam that ranges from about 9 to 25 inches in thickness. The subsoil is dark-brown or dark grayish-brown, firm, subangular blocky gravelly light loam. The substratum is very dark grayish-brown, dark grayish-brown, or yellowish-brown, friable, massive gravelly sandy loam.

Pleasant View soils are near the Marriott, calcareous variant, the Ridd, and the Draper soils. The native vegetation is mainly sand dropseed, sagebrush, and bunch grasses.

The Pleasant View soils are used mainly for irrigated orchards.

Pleasant View loam, 6 to 10 percent slopes (PvD).—This soil occurs in the vicinity of North Ogden on high, slightly undulating, alluvial-colluvial fans.

A representative profile:

0 to 25 inches, very dark grayish-brown loam and gravelly loam; friable; platy structure in the top 4 inches, subangular blocky structure below a depth of 4 inches; noncalcareous; mildly alkaline or neutral.

25 to 34 inches, dark-brown gravelly light loam; firm; subangular blocky structure; slightly calcareous; mildly alkaline.

34 to 45 inches, very dark grayish-brown gravelly sandy loam; friable; massive; moderately calcareous; moderately alkaline.

45 to 67 inches, dark grayish-brown and yellowish-brown gravelly sandy loam; friable; massive or single grain; strongly calcareous; moderately alkaline.

The surface layer ranges from about 10 to 13 inches in thickness and from loam to gravelly sandy loam in texture. By volume, about 10 to 30 percent of this layer is fine chiplike gravel. The percentage of gravel generally increases with depth, and below a depth of 32 to 36 inches pebbles and cobbles make up as much as 60 percent of the soil mass. The surface layer and upper subsoil are generally leached of lime to a depth of 30 to 35 inches, and the lime has accumulated below this depth.

Included with this soil in the mapping were small areas of gravelly sandy loam, areas of stony loam, and small areas that have slopes steeper than 10 percent. Also included are a few small areas that are moderately eroded and that have occasional gullies.

This soil is well drained and is moderately permeable. It holds about 1.8 inches of available water per foot of soil, or about 8 inches to a depth of 5 feet. Roots penetrate to a depth of 4 feet or more. Natural fertility is moderately high. Runoff is medium, and the hazard of erosion is moderate. This soil is friable and is easy to work.

Most of this soil is cultivated and used mainly for irrigated crops of cherries, peaches, and apricots. This soil is well suited to orchards and to irrigated improved pasture. Controlling erosion is the principal concern of management. (Capability unit IIIe–3; Upland Loam range site)

Pleasant View loam, 1 to 3 percent slopes (PvB).—This soil is on the lower part of alluvial fans in the vicinity of North Ogden. Except that it is less sloping and only about 5 to 10 percent of the surface layer is fine gravel, this soil is similar to Pleasant View loam, 6 to 10 percent slopes. The surface layer is about 12 to 15 inches thick.

Included with this soil in the mapping were small areas that have slopes of more than 3 percent.

Runoff is slow, and normally the hazard of erosion is slight. Natural fertility is high.

This soil is used for and is well suited to irrigated general farm crops and orchards. The main irrigated crops are alfalfa, small grains, corn, cherries, peaches, and apricots. The most needed management is land leveling that insures even distribution of irrigation water. (Capability unit IIe–3; not used for range)

Pleasant View loam, 3 to 6 percent slopes (PvC).—This soil is on moderately sloping alluvial fans. In most places it is adjacent to Pleasant View loam, 6 to 10 percent slopes, but is in lower positions, is less sloping, and contains fewer coarse fragments throughout the profile. The surface layer is 11 to 14 inches thick. Runoff is medium.

Included with this soil in the mapping were a few small areas of loam that have slopes of less than 3 percent and a few that have slopes of more than 6 percent.

This soil is used mainly for peach, apricot, and cherry orchards and is well suited to them. A small acreage is used for alfalfa and small grains. This soil is also well suited to improved pasture or hay. Efficient use of irrigation water and the control of erosion are important concerns of management. (Capability unit IIIe–2; not used for range)

Pleasant View loam, 10 to 20 percent slopes (PvE).—This soil is on the moderately steep, higher parts of alluvial-colluvial fans on the foot slopes of the Wasatch Mountains in the northeastern part of the survey area. This soil is more sloping than Pleasant View loam, 6 to 10 percent slopes, and is slightly less gravelly and cobbly. The surface layer is 9 to 12 inches thick.

Included with this soil in the mapping were a few small areas of stony loam and areas of gravelly sandy loam. Also included were some small areas that have slopes of less than 10 percent.

Runoff is medium, and the hazard of erosion is high.

This soil is used mainly for peach, cherry, and apricot orchards. Sprinkler irrigation permits more efficient use of water than other methods and is less likely to cause erosion. (Capability unit IVe–4; not used for range)

Pleasant View loam, 10 to 20 percent slopes, eroded (PvE2).—This soil occurs along the drainageways and on the higher parts of alluvial-colluvial fans at the base of the Wasatch Mountains. It is similar to Pleasant View loam, 10 to 20 percent slopes, but is eroded and dissected by gullies.

All of this soil is used as range. Reseeding, stablizing the gullies, and protecting against runoff from adjacent areas are the main concerns of management. (Capability unit VIe–1; Upland Loam range site)

Pleasant View gravelly sandy loam, 3 to 6 percent slopes (PwC).—This soil occurs on moderately sloping fans in the vicinity of North Ogden. It is near Ackmen loam. This soil is similar to Pleasant View loam, 6 to 10 percent

slopes, but is less sloping and has a gravelly sandy loam surface layer. By volume, about 20 to 40 percent of the surface layer is gravel.

Included with this soil in the mapping were a few small areas that are slightly steeper than 6 percent and areas of deep loam that are not gravelly.

Most of this soil is used for orchards, but some is used for community developments. This soil is well suited to irrigated cherries, apricots, and peaches, which are the main crops. It is also suited to irrigated improved pasture and to grass-legume hay. Efficient use of irrigation water and the control of erosion are important concerns of management. (Capability unit IIIe–2; not used for range)

Pleasant View gravelly sandy loam, 6 to 10 percent slopes (PwD).—This soil occurs on strongly sloping fans near North Ogden, where it is mainly near Ackmen loam. Except for its gravelly sandy loam surface layer, this soil is similar to Pleasant View loam, 6 to 10 percent slopes. By volume, the surface layer is about 20 to 40 percent gravel.

Most of this soil is used for orchards and for community developments. This soil is well suited to cherries, peaches, and apricots, which are the main crops. It is also suited to improved pasture and to grass-legume hay. Efficient use of irrigation water and the control of erosion are important concerns of management. (Capability unit IIIe–3; not used for range)

Preston Series

The Preston series consists of deep, excessively drained, coarse-textured soils in the uplands. These nearly level to moderately steep soils formed in wind-deposited sand. Elevations range from 4,300 to 5,200 feet above sea level.

The surface layer is dark-brown, loose fine sand 1 to 8 inches thick. The subsoil and substratum are loose fine sand but are slightly lighter in color than the surface layer. These soils are generally noncalcareous and mildly alkaline throughout their profile, but in some places their substratum is slightly calcareous.

Preston soils are commonly near the Francis, Kidman, and Marriott soils. The native vegetation consists of sand dropseed, Indian ricegrass, cheatgrass brome, and scattered sagebrush.

Preston soils are limited in use. Some areas are used as range, some for irrigated farming, some for industrial developments, and some are idle.

Preston fine sand, duned, 1 to 10 percent slopes (PyB).—This soil is moderately extensive. It occurs on partially stablized dunes that range from 3 to 6 feet or more in height. This soil occurs mainly near the Hill Air Force Base in Davis County and south of Ogden in Weber County.

A representative profile:

0 to 7 inches, dark-brown fine sand; loose; granular structure that breaks easily to single grain; neutral.
7 to 48 inches, dark-brown to brown fine sand; loose; single grain; neutral.
48 to 65 inches, dark-brown to brown fine sand; loose; single grain; mildly alkaline.

In places, 1 to 3 inches or more of recently deposited, lighter colored sand is on the surface. The surface layer ranges from about 1 to 8 inches in thickness. The dunes have been partially stabilized by vegetation.

Included with this soil in the mapping were some small areas of darker colored sandy soils that have a higher content of organic matter, and other small areas that have a moderately permeable substratum of silty clay loam below a depth of 36 inches.

This soil is excessively drained and is rapidly permeable. It holds about 0.5 inch of available water per foot of soil, or about 2.5 inches to a depth of 5 feet. Roots penetrate to a depth of about 20 inches. Natural fertility is low. Runoff is slow. Water erosion is a slight to moderate hazard, and the hazard of soil blowing is high.

Most of this soil is used as range, but yields of herbage are low. Tillage is impractical, because of the dunes. The control of soil blowing is the principal concern of management. (Capability unit VIs–1; Upland Sand range site)

Preston fine sand, 1 to 10 percent slopes (PxB).—This soil is on gently sloping to strongly sloping or slightly undulating uplands, mainly in the east-central part of the survey area. It is similar to Preston fine sand, duned, 1 to 10 percent slopes, but sand dunes, if they occur, are small and less than 3 feet high. The surface layer is 3 to 7 inches thick.

Part of the acreage of this soil is used for industrial development, part as range, and a small acreage for irrigated farming. Where sprinkler irrigation is available, this soil is well suited to irrigated improved pasture and to orchards. Cover crops are needed between the trees of orchards. Providing adequate cover to help control soil blowing is the most needed management. (Capability unit IVs–4; Upland Sand range site)

Preston fine sand, 10 to 20 percent slopes (PxE).—This soil is on moderately steep uplands near the base of the Wasatch Mountains, mainly in the east-central part of the survey area near the mouth of Weber River Canyon. It is similar to Preston fine sand, duned, 1 to 10 percent slopes, but it is steeper and in most places lacks dunes. The surface layer is 4 to 8 inches thick.

This soil is used as range and as wildlife habitat. It is not suitable for cultivation. (Capability unit VIs–1; Upland Sand range site)

Refuge Series

The Refuge series consists of deep, somewhat poorly drained, salty soils on nearly level low flood plains in the northwestern part of the survey area. These soils formed in medium-textured mixed alluvium. Elevations range from 4,205 to 4,220 feet above sea level.

The surface layer is very dark grayish-brown or dark-brown, friable loam that ranges from about 6 to 12 inches in thickness. The subsoil is brown to dark-brown, friable fine sandy loam or loam. The substratum is brown, very friable fine sand. These soils contain salt throughout their profile. The highest content of salts is generally in the subsoil between depths of about 20 and 40 inches.

Refuge soils are commonly near the Wayment soils, but in some places they are near the Arave, Lakeshore, Leland, Warm Springs, and Sunset soils. The native vegetation is mainly saltgrass, foxtail barley, peppergrass, and cheatgrass brome.

Refuge soils are used only as range.

Refuge loam (Ra).—This soil is extensive. It is on nearly level low flood plains in the northwestern part of the survey area. It occurs mainly with Wayment silty clay loam and with Sunset loam, strongly alkali, 0 to 1 percent slopes.

A representative profile:

0 to 3 inches, very dark grayish-brown loam; friable; platy structure; moderately calcareous; mildly alkaline.
3 to 8 inches, dark-brown silt loam; friable; granular structure; moderately calcareous; strongly alkaline.
8 to 21 inches, brown fine sandy loam; friable; massive; moderately calcareous; strongly alkaline.
21 to 47 inches, brown to dark-brown loam; friable; moderately calcareous; moderately alkaline.
47 to 71 inches, brown fine sand; very friable; massive; moderately calcareous; moderately alkaline.

The surface layer is 6 to 12 inches thick and is dominantly loam. Faint to distinct yellowish-brown mottles occur below a depth of 3 inches. Depth to the water table ranges from about 24 to 60 inches. Strong concentrations of salts occur below a depth of 20 inches.

Included with this soil in the mapping were some small areas of very salty silty clay loam, some areas of fine sandy loam, and some areas of silt loam.

This soil is somewhat poorly drained and is moderately to slowly permeable. It holds about 1.5 inches of available water per foot of soil to a depth of about 2 feet. Below a depth of 2 feet, the content of salts is high and little water is available to plants. Few roots penetrate below a depth of 20 inches. Natural fertility is moderately low. Runoff is slow, and the hazard of erosion is slight. This soil is friable and easy to work.

This soil is used mainly as range. It is suitable for crops only if it is drained and reclaimed. Drainage and reclamation are difficult because this soil is in a low position. Drained and reclaimed areas are suited to irrigated improved pasture, to grass-legume hay, and to occasional crops of small grains or corn. (Capability unit IVw–3; Alkali Bottom range site)

Ridd Series

The Ridd series consists of moderately deep, well-drained and somewhat excessively drained, rocky and stony soils in the uplands. These strongly sloping to very steep soils are on the south- and west-facing slopes of the Wasatch Mountains. They are underlain by bedrock at a depth of 25 to 40 inches. These soils formed in alluvium and colluvium that were derived mainly from weathered gneiss, schist, and quartzite. Elevations range from 4,600 to 5,600 feet above sea level.

The surface layer is very dark grayish-brown or very dark brown, friable rocky or stony sandy loam about 7 to 15 inches thick. The subsoil is dark-brown, firm, subangular blocky cobbly or stony sandy loam or loam. The substratum is olive-brown or olive, friable, massive very gravelly sandy loam.

Ridd soils are near the Kilburn and Sterling soils and the noncalcareous Timpanogos soils. The native vegetation consists mainly of brushy Gambel oak, sagebrush, bluebunch wheatgrass, and lupine.

Ridd soils are used as range, wildlife habitat, and watersheds.

Ridd rocky sandy loam, 30 to 70 percent slopes, eroded (RkG2).—This soil occurs along the steep faces of the Wasatch Mountains above the highest lake terraces. About 90 percent of areas mapped as this soil is Ridd stony sandy loam that has slopes of 30 to 70 percent; about 10 percent is Rock outcrop.

A representative profile of Ridd stony sandy loam:

0 to 9 inches, very dark grayish-brown stony sandy loam; friable; granular structure; neutral.
9 to 18 inches, dark-brown cobbly heavy sandy loam; firm; subangular blocky structure; neutral.
18 to 26 inches, olive-brown gravelly sandy loam; firm; subangular blocky structure; neutral.
26 to 36 inches +, olive very gravelly sandy loam; friable; neutral.

The surface layer ranges from about 7 to 11 inches in thickness. By volume, about 3 percent of this layer is stone fragments and 20 to 40 percent is cobbles and pebbles. The subsoil dominantly is cobbly or gravelly sandy loam, but about 30 to 60 percent is coarse rock fragments. From 50 to 90 percent of the substratum is coarse fragments. Depth to bedrock ranges from about 25 to 40 inches. The available water capacity is about 4 to 5 inches to a depth of 5 feet.

Included with this soil in the mapping were areas of Rock outcrop and areas of deep gravelly sandy loam.

This soil is well drained or somewhat excessively drained and has moderately rapid permeability. Runoff ranges from medium to rapid and depends on the kind and amount of vegetation, the degree of slope, and the general condition of the soil. The hazard of erosion is high.

This soil is used as wildlife habitat and watersheds. (Capability unit VIIs–1; Mountain Stony Loam range site)

Ridd stony sandy loam, 6 to 10 percent slopes (RdD).—This soil is on strongly sloping foot slopes of the Wasatch Mountains. It is slightly less stony than Ridd rocky sandy loam, 30 to 70 percent slopes, eroded, and is less sloping. The surface layer is 10 to 15 inches thick. The hazard of erosion is moderate.

Included with this soil in the mapping were a few small areas of very stony loam.

This soil is used only as range. It is not suited to cultivated crops. (Capability unit VIIs–1; Upland Stony Loam range site)

Ridd rocky sandy loam, 10 to 30 percent slopes, eroded (RkE2).—This soil occurs on moderately steep to steep foot slopes of the Wasatch Mountains in the northeastern part of the survey area. It is similar to Ridd rocky sandy loam, 30 to 70 percent slopes, eroded, but this soil has slightly larger stones, both on the surface and throughout the profile. The surface layer ranges from about 7 to 12 inches in thickness.

Included with this soil in the mapping were small areas of Rock outcrop. These areas make up about 10 percent of the mapping unit.

This soil is used mainly for grazing early in spring. It is not suited to cultivated crops. (Capability unit VIIs–1; Upland Stony Loam range site)

Rock Outcrop

Rock outcrop (Ro) consists of areas of bare bedrock. These areas occur north of Ogden on the face of the

Wasatch Mountains in the northeastern part of the survey area. The bedrock is quartzite in most areas but is limestone in small areas. Slopes are mainly very steep. Rock outcrop is barren, except for a few trees and shrubs that grow in crevices. It is essentially worthless for producing plants. (Capability unit VIIIs–1; not suited to range)

Roshe Springs Series

The Roshe Springs series consists of deep, poorly drained and very poorly drained soils. These soils are in depressions on low lake terraces and on flood plains. They formed in areas where the water table was continuously high. They are commonly nearly level, but in a few areas they are gently sloping. Elevations range from about 4,225 to 4,600 feet above sea level.

The surface layer is black or very dark gray, friable silt loam about 6 to 12 inches thick. In places a layer of peat 1 to 5 inches thick is on the surface. The subsoil is very dark gray to gray, firm loam. The substratum is gray, massive loam in most places, but it ranges from fine sandy loam to clay. This soil has a high content of lime throughout the profile; the heaviest concentration is near the surface.

Roshe Springs soils are generally near the Ironton, Cudahy, and Logan soils, but in a few places they are near the Woods Cross, Sunset, and Kirkham soils. The native vegetation is saltgrass, Kentucky bluegrass, sedges, and rushes.

Roshe Springs soils are used mainly for native pasture and hay, but some drained areas are used for irrigated crops.

Roshe Springs silt loam (Rs).—This soil is on gently sloping lake terraces in the north-central part of the survey area, southwest of Pleasant View in Weber County. It is mainly near the base of the Wasatch Mountains in an area that has been strongly faulted and is marked by many springs and seeps.

A representative profile:

0 to 7 inches, very dark gray silt loam; friable; granular structure; very strongly calcareous; mildly alkaline.
7 to 12 inches, very dark gray loam; firm; subangular blocky structure; very strongly calcareous; mildly alkaline.
12 to 33 inches, gray loam; firm; massive; very strongly calcareous; mildly alkaline.
33 to 52 inches, gray loam; friable; massive; very strongly calcareous; and mildly alkaline; many lime nodules.

The surface layer is high in organic-matter content but is not peaty. The water table is generally at a depth of 20 to 36 inches.

Included with this soil in the mapping were a few small areas that have a shallow water table and small areas that have a deep water table.

This soil is poorly drained and is moderately permeable. It holds about 2.2 inches of available water per foot, or about 10 to 11 inches to a depth of 5 feet. Roots penetrate deeply. Natural fertility is moderately high. Runoff is slow, and the hazard of erosion is slight.

This soil is used mainly for irrigated crops. Drained areas are well suited to irrigated crops of corn, small grains, sugarbeets, truck crops, and other general crops. These areas are also suited to irrigated improved pasture. (Capability unit IIIw–2; Wet Meadow range site)

Roshe Springs silt loam, deep over clay (Rt).—This soil is on nearly level low lake terraces in the southern part of the survey area about a mile west of Centerville. Except that it is nearly level and overlies very slowly permeable clay below a depth of 3 feet, this soil is similar to Roshe Springs silt loam. In most places the water table is at a depth of about 3 feet. In places this soil is moderately affected by alkali.

Included with this soil in the mapping were a few small areas of silty clay loam.

This soil is used mainly for irrigated crops and pasture. Drained areas are well suited to irrigated improved pasture and to some kinds of truck crops. (Capability unit IVw–1; not used for range)

Roshe Springs silt loam, shallow water table (Rw).—This nearly level or very slightly undulating soil is in slight depressions on low lake terraces. It occurs mainly in two general areas; the larger area is west of Woods Cross in Davis County, and the smaller area is south and west of Pleasant View in Weber County.

This soil has a water table that is near the surface most of the time and, in most places, has 1 to 5 inches of peat on the surface; otherwise, it is similar to Roshe Springs silt loam.

Included with this soil in the mapping were small areas of silt loam that have a lime hardpan and some areas of silty clay loam.

This soil is very poorly drained and is moderately to slowly permeable. Because the water table is high, roots seldom penetrate below the surface layer. Natural fertility is moderate. Runoff is slow to ponded, and the hazard of erosion is none to slight.

This soil is used mainly for unimproved pasture, but one cutting of hay is harvested annually on some fields. Drainage is needed if cultivated crops are grown. Drained areas are well suited to improved pasture and to some kinds of truck crops. (Capability unit IVw–1; Wet Meadow range site)

Saltair Series

The Saltair series consists of deep, level or nearly level, poorly drained and very poorly drained, salty soils. These soils are on lake plains along the shore of Great Salt Lake. They formed in moderately fine textured mixed lake sediments. Elevations range from about 4,200 to 4,230 feet above sea level.

The surface layer is light brownish-gray, very firm silty clay loam 1 to 4 inches thick. The subsoil is light olive-gray, firm, massive silty clay loam. The substratum is pinkish-gray to light brownish-gray and ranges from loamy fine sand to clay. In most places the surface is crushed with salts, and salts are highly concentrated throughout the profile.

Saltair soils are near the Warm Springs, Arave, Payson, and Lakeshore soils. The native vegetation is scattered saltgrass, samphire, and pickleweed.

Saltair soils are mainly barren, but they have some value as wildlife habitat.

Saltair silty clay loam (Sa).—This soil is on the level or nearly level lake plain bordering Great Salt Lake in the western part of the survey area.

A representative profile:

0 to 4 inches, light brownish-gray silty clay loam; very firm; moderately calcareous; very strongly alkaline.
4 to 9 inches, light olive-gray silty clay loam; firm; massive; moderately calcareous; very strongly alkaline.
9 to 20 inches, light olive-gray silty clay loam; firm; massive; moderately calcareous; strongly alkaline.
20 to 32 inches, light olive-gray silt loam; firm; massive; moderately calcareous; strongly alkaline.
32 to 60 inches, pinkish-gray to light brownish-gray silty clay loam; firm; massive; moderately calcareous; strongly alkaline.

A salt crust commonly is on the surface of this soil, and there is a high content of salts throughout the profile. Texture of the substratum ranges from loamy fine sand to clay. The water table generally is at or near the surface.

Included with this soil in the mapping were some small areas of silt loam.

This soil is poorly drained or very poorly drained and is very slowly permeable. In most places the soil is saturated with water, but, because of the high content of salts, little water is available to plants. Runoff is slow to ponded, and erosion is not a hazard.

This soil is unsuited to crops or as range. Most areas are barren. (Capability unit VIIIw–1; not suited to range)

Steed Series

The Steed series consists of well drained and moderately well drained, nearly level or gently undulating soils on flood plains along the Weber River. These soils are gravelly in places. They formed in moderately coarse textured mixed alluvium. Elevations range from 4,300 to 4,600 feet above sea level.

The surface layer is very dark grayish-brown to dark-brown, friable fine sandy loam or gravelly fine sandy loam 4 to 10 inches thick. The subsoil is brown, friable gravelly fine sandy loam or gravelly loamy fine sand. The substratum is very gravelly and cobbly coarse sand.

Steed soils are near the Sunset and Martini soils and Cobbly alluvial land. The native vegetation is mainly cottonwood, boxelder, and willow trees and sagebrush and cheatgrass brome.

Steed soils are used mainly as range, but some areas have been cleared and are used for irrigated crops.

Steed fine sandy loam, 0 to 1 percent slopes (SbA).—This slightly undulating soil occurs mainly on the higher parts of the flood plain along the Weber River.

A representative profile:

0 to 9 inches, very dark grayish-brown to dark-brown fine sandy loam; very friable; granular structure; moderately calcareous; mildly alkaline.
9 to 13 inches, brown loamy fine sand; very friable; massive; moderately calcareous; moderately alkaline.
13 to 17 inches, brown gravelly loamy fine sand; loose; single grain; slightly calcareous; moderately alkaline.
17 inches +, brown very gravelly and cobbly coarse sand; loose; single grain; slightly calcareous; moderately alkaline.

The surface layer ranges from 6 to 10 inches in thickness. In places the subsoil is mottled.

Included with this soil in the mapping were a few small, narrow areas of gravelly fine sandy loam. Also included were some areas of loamy fine sand and of light loam.

This soil is mainly well drained and is moderately permeable. It holds about 1.5 inches of available water per foot of soil in the surface layer and about 0.5 inch in the subsoil, or about 4 inches to a depth of 5 feet. Roots penetrate deeply. Natural fertility is moderate. Runoff is slow, but there is a slight hazard of soil blowing if the surface is bare early in spring. This soil is generally in good tilth, is easy to work, and can be cultivated within a wide range of moisture content.

This soil is used mainly for irrigated crops, for which it is well suited. Alfalfa, corn, small grains, tomatoes, and potatoes are the main crops. Fertilizer is needed for favorable yields, and irrigation should be frequent and light. (Capability unit IIIs–1; not used for range)

Steed fine sandy loam, 0 to 1 percent slopes, channeled (ScA).—This soil occurs on flood plains adjacent to or near the channel of the Weber River. This soil is dissected by many old stream channels 2 to 3 feet deep; otherwise, it is similar to Steed fine sandy loam, 0 to 1 percent slopes.

Included with this soil in the mapping were small areas of gravelly soils and other areas of deep sandy soils.

Most areas of this soil have a cover consisting of cottonwoods, boxelders, willows, rose bushes, and bunch grasses. Cultivation is limited by the need for clearing and land leveling, but these improvements are costly. Land leveling is difficult because of the large content of pebbles and cobbles and the large amount of soil material needed to fill the channels.

This soil is used mainly as range. Where it is cleared and leveled, it is suited to irrigated crops. (Capability unit IIIs–1; Upland Stony Loam range site)

Steed gravelly fine sandy loam, 0 to 2 percent slopes (SdA).—This soil is on nearly level to very gently sloping flood plains of the Weber and Ogden Rivers. Except that it is gravelly throughout the profile, this soil is similar to Steed fine sandy loam, 0 to 1 percent slopes. The surface layer ranges from about 5 to 8 inches in thickness. The available water capacity is about 3 to 3.5 inches to a depth of 5 feet. This gravelly soil is moderately difficult to till.

Included with this soil in the mapping were some areas of Cobbly alluvial land.

This soil is used as range, for irrigated crops, and for industrial developments. Use for industrial developments is increasing. This soil is well suited to alfalfa, small grains, and tomatoes. It is also well suited to irrigated improved pasture. Most needed on this droughty soil is management that provides efficient use of irrigation water. (Capability unit IVs–1; Upland Stony Loam range site)

Steed gravelly fine sandy loam, 0 to 2 percent slopes, channeled (SeA).—This soil occurs on the flood plain near the channel of the Weber River. It is dissected by many old stream channels that are mainly 2 to 3 feet deep. Except for these channels, this soil is similar to Steed gravelly fine sandy loam, 0 to 2 percent slopes. Most areas have a cover of cottonwoods, boxelders, willows, rose bushes, and bunch grasses. Cultivation is limited by the need for clearing and land leveling, but these

improvements are costly. Land leveling is difficult because of the large content of pebbles and cobbles, and the large amount of soil material needed to fill the channels.

This soil is used mainly as range. Where it is cleared and leveled, it is well suited to irrigated improved pasture. (Capability unit IVs–1; Upland Stony Loam range site)

Sterling Series

The Sterling series consists of somewhat excessively drained, gravelly, cobbly, or stony, medium-textured soils. These soils are on sloping to steep alluvial fans at the base of the Wasatch Mountains. They formed in local alluvium and colluvium that were derived dominantly from weathered limestone but partly from quartzite. Elevations range from 4,450 to 5,000 feet above sea level.

The surface layer is very dark brown or very dark grayish-brown, friable gravelly, stony, or cobbly loam about 10 to 16 inches thick. The subsoil is brown or dark-brown, firm very cobbly or very stony loam that is moderately high in lime. The subsoil overlies very cobbly sandy loam.

Sterling soils are commonly near the Ridd, Parleys, and Pleasant View soils. The native vegetation is mainly sagebrush, brushy Gambel oak, cheatgrass brome, western wheatgrass, sand dropseed, and three-awn.

The steeper Sterling soils are used as range; those not so steep are used for irrigated orchards.

Sterling cobbly loam, 8 to 20 percent slopes (SgE).—This soil occurs mainly in the vicinity of North Ogden on ridges and alluvial fans. Slopes are dominantly west and southwest facing.

A representative profile:

0 to 16 inches, very dark brown cobbly loam; friable; platy and subangular blocky structure; mildly alkaline.
16 to 22 inches, brown or dark-brown very cobbly loam; friable; subangular blocky structure; strongly calcareous; moderately alkaline.
22 to 48 inches +, brown very cobbly sandy loam; friable; massive; strongly calcareous; moderately alkaline.

The surface layer ranges from about 13 to 16 inches in thickness. By volume, pebbles and cobbles make up 30 to 50 percent of the surface layer.

Included with this soil in the mapping were some areas that have a stony surface layer, small areas of gravelly loam, and small areas of cobbly sandy loam.

This soil is somewhat excessively drained and is rapidly or very rapidly permeable. It holds about 1 inch of available water per foot of soil in the upper 18 to 20 inches and about 0.5 to 0.7 inch per foot below that depth, or about 3.5 inches to a depth of 5 feet. Roots penetrate to a depth of more than 48 inches. Natural fertility is moderately low. Runoff is slow to medium and depends on the degree of slope and the kind and amount of vegetation. The hazard of erosion is moderate. Tillage of this cobbly soil is difficult.

This soil is used dominantly as range or watersheds. About 30 percent is cultivated. Most of the cultivated acreage is used for cherry, peach, and apricot orchards, a moderately good use. Sprinkler irrigation permits the most efficient use of water and is less likely to cause erosion than other methods. (Capability unit IVs–3; Upland Stony Loam range site)

Sterling gravelly loam, 6 to 10 percent slopes (SfD).—This soil occurs on strongly sloping alluvial fans in the vicinity of North Ogden. Except that it is gravelly instead of cobbly, this soil is similar to Sterling cobbly loam, 8 to 20 percent slopes. Also, it is in a slightly lower position and is less sloping in most places than that soil. The surface layer ranges from about 12 to 16 inches in thickness.

Included with this soil in the mapping were small areas of cobbly loam.

This soil holds about 0.7 to 1 inch of available water per foot of soil, or about 3.5 to 4 inches to a depth of 5 feet. Runoff is medium, and the hazard of erosion is moderate.

Most of this soil is used for cherry, peach, and apricot orchards. It is well suited to orchards and to irrigated improved pasture. Sprinkler irrigation permits the most efficient use of water and is less likely to cause erosion than other methods. (Capability unit IVs–2; Upland Stony Loam range site)

Sterling very rocky loam, 6 to 50 percent slopes, eroded (ShF2).—This soil occurs on sloping to steep alluvial and colluvial fans on the foot slopes of mountains in the vicinity of North Ogden. It is at slightly higher elevations than Sterling cobbly loam, 8 to 20 percent slopes, and is more eroded. This soil has a stony surface layer and is somewhat more cobbly and stony throughout than that soil. This mapping unit consists of about 85 percent stony loam and about 15 percent Rock outcrop.

Included with this soil in the mapping were areas that are covered by boulders 10 feet or more in diameter. These areas are dominantly on the steeper slopes. Also included were areas of Rock outcrop. These areas make up about 15 percent of the mapping unit.

This soil is somewhat excessively drained and has very rapid permeability. Roots penetrate to an average depth of about 30 inches. Runoff is medium to rapid, and the hazard of erosion is high.

All of this soil is used as range and watersheds. It is not suited to cultivated crops. (Capability unit VIIs–1; Upland Stony Loam range site)

Sunset Series

The Sunset series consists of deep, nearly level, moderately well drained and somewhat poorly drained soils. These medium-textured soils are on flood plains and low terraces along rivers. They formed in medium-textured mixed alluvium. Elevations range from 4,220 to 4,800 feet above sea level.

The surface layer is very dark grayish-brown, friable loam 8 to 24 inches thick. The subsoil and substratum are friable loam, but they become lighter in color with increasing depth. The substratum is highly stratified in places, and the texture ranges from loam to gravelly loamy sand.

Sunset soils are near the Steed, Martini, and Kirkham soils. The native vegetation is bunch grasses, rose bushes, sagebrush, and cheatgrass brome.

The Sunset soils are used mainly for irrigated crops, but unimproved areas are used as range.

263-315—68——8

Sunset loam, 0 to 1 percent slopes (SkA).—This soil is on smooth to very gently undulating flood plains and low river terraces. It occurs near the Weber River, mainly with Martini fine sandy loam and Steed fine sandy loam.

A representative profile:

0 to 18 inches, very dark grayish-brown loam; friable; granular structure; moderately calcareous; mildly alkaline.
18 to 32 inches, dark-brown loam; very friable; moderately calcareous; moderately alkaline.
32 to 68 inches, dark-brown loam; very friable; moderately calcareous; mildly to moderately alkaline.

The surface layer ranges from about 15 to 24 inches in thickness. The substratum is commonly stratified loam to sandy loam. Unless it is drained, this soil is saturated within 40 inches of the surface during most of the growing season. Much of the acreage has been drained. In drained areas the water table is below a depth of 40 inches, but distinct mottles occur between a depth of 20 and 40 inches. Some areas of this soil are moderately affected by salts and alkali.

Included with this soil in the mapping were a few small areas of loam that have a gravelly substratum and a few very narrow areas of gravelly sandy loam.

This soil is somewhat poorly drained and is moderately permeable. It holds about 2 inches of available water per foot of soil, or about 10 inches to a depth of 5 feet. Roots penetrate deeply. Natural fertility is high. Runoff is slow, and the hazard of erosion is slight. This soil generally in in good tilth, and tillage is easy.

This soil is used mainly for irrigated crops, but some areas are used as range. The principal crops are alfalfa, small grains, corn, and sugarbeets. This soil is well suited to irrigation and to many kinds of crops. Land leveling so that irrigation water can be distributed evenly is the most needed management, but drainage is required in some areas. (Capability unit IIw–3; Semiwet Meadow range site)

Sunset loam, 1 to 3 percent slopes (SkB).—This soil is on gently sloping river terraces adjacent to the steep escarpments of lake terraces. It is also in narrow drainageways of intermittent streams that have cut into the lake terraces. This soil is similar to Sunset loam, 0 to 1 percent slopes, but it is slightly more sloping.

Included with this soil in the mapping were small areas of Sunset loam that have slopes of less than 1 percent.

Runoff is slow, and the hazard of erosion is slight.

This soil is used mainly for irrigated crops of alfalfa, small grains, corn, and sugarbeets. More careful irrigation is required on this soil than on Sunset loam, 0 to 1 percent slopes, so that water is evenly distributed without causing erosion. (Capability unit IIw–4; Semiwet Meadow range site)

Sunset loam, gravelly substratum, 0 to 1 percent slopes (SnA).—This soil is on nearly level river flood plains near the Weber River. It is similar to Sunset loam, 0 to 1 percent slopes, but has a gravelly sandy loam substratum at a depth ranging from 25 to 36 inches.

Included with this soil in the mapping were small areas of Sunset loam, 0 to 1 percent slopes.

This soil holds about 5.5 to 6 inches of available water to a depth of 5 feet, but the gravelly substratum holds only about 0.5 inch per foot.

This soil is used for irrigated crops of alfalfa, small grains, corn, and sugarbeets. Yields are somewhat lower than those on Sunset loam, 0 to 1 percent slopes. This soil is well suited to irrigation and to many kinds of crops. Land leveling so that irrigation water can be distributed evenly is the most needed management, but drainage is needed in some areas. (Capability unit IIs–2; Semiwet Meadow range site)

Sunset loam, strongly alkali, 0 to 1 percent slopes (SmA).—This soil is on lower, nearly level parts of river flood plains, mainly near Warren in Weber County. Except that it is strongly affected by salts and alkali, this soil is similar to Sunset loam, 0 to 1 percent slopes. The surface layer is 8 to 11 inches thick. Permeability is slow.

Included with this soil in the mapping were small areas of other Sunset soils and of silty clay loam.

This soil is used for irrigated crops and as range. Where it is drained and reclaimed from damage by salts and alkali, this soil is well suited to cultivation. Small grains, corn, sugarbeets, and alfalfa are the main crops, but yields are generally low. (Capability unit IIIw–6; Alkali Bottom range site)

Syracuse Series

The Syracuse series consists of deep, somewhat poorly drained, nearly level to gently sloping soils. These soils formed in coarse-textured lake sediments that have been reworked by wind. Elevations range from 4,220 to 4,600 feet above sea level.

The surface layer is very dark grayish-brown, loose to very friable loamy fine sand 6 to 12 inches thick. The subsoil is light brownish-gray or dark grayish-brown, loose loamy fine sand or sandy loam. The substratum is light-gray or very pale brown, loose loamy fine sand or sandy loam.

Syracuse soils are commonly near the Warm Springs and Ford soils. The native vegetation is mainly saltgrass and fourwing saltbush.

Syracuse soils are drained and used extensively for irrigated crops. Undrained areas are used as range.

Syracuse loamy fine sand (So).—This soil is on slightly undulating low lake terraces in the western part of the survey area. It is widely distributed and occurs mainly with Warm Springs soils. Slopes generally are slightly less than 1 percent, but in places they are as much as 2 percent.

A representative profile:

0 to 11 inches, very dark grayish-brown loamy fine sand; loose; granular; noncalcareous; moderately alkaline.
11 to 21 inches, dark grayish-brown sandy loam or loamy fine sand; loose or very friable; slightly calcareous; moderately alkaline.
21 to 30 inches, light brownish-gray sandy loam; loose to very friable; moderately calcareous; strongly alkaline.
30 to 60 inches, light-gray sandy loam; loose; strongly calcareous; very strongly alkaline.

The surface layer ranges from 9 to 12 inches in thickness. The effect of salts and alkali is mainly slight to moderate.

Included with this soil in the mapping were small areas of fine sandy loam and a few small areas that are strongly affected by salts and alkali.

This soil is somewhat poorly drained and has moderately rapid permeability. The water table is below a depth of 3 feet most of the time. This soil holds about 1.3 inches of available water per foot of soil, or about 6.5 inches to a depth of 5 feet. Roots penetrate to the water table. Runoff is slow. The hazard of soil blowing is moderate. Soil blowing is most likely early in spring in freshly plowed areas. Tilth is generally good. This soil is easy to work, and it can be cultivated within a wide range of moisture content.

Most areas of this soil have been drained with either tile or open drains and are used mainly for irrigated farming. Where it is adequately drained, this soil is well suited to irrigation and to many kinds of crops. The main crops are corn, small grains, alfalfa, sugarbeets, and tomatoes. Some leaching is needed at times to keep the content of salts low. (Capability unit IIw–5; not used for range)

Syracuse loamy fine sand, strongly alkali (Sy).—This soil occurs on slightly concave, nearly level low lake terraces in the western part of the survey area. This soil is similar to Syracuse loamy fine sand but is strongly affected by alkali. The surface layer is 6 to 10 inches thick. This soil has moderate permeability. Depth to the water table ranges from about 24 to 36 inches.

Included with this soil in the mapping were small areas of fine sandy loam that are strongly affected by alkali.

This soil is used for general farming, but crops are spotty and uneven and yields are generally much lower than those on Syracuse loamy fine sand. Where it is drained and reclaimed from alkali, this soil is well suited to irrigation and to many kinds of crops. (Capability unit IIIw–6; Alkali Bottom range site)

Terminal Series

The Terminal series consists of somewhat poorly drained soils that are moderately deep, over a lime-cemented hardpan. These soils are moderately affected by salts and alkali. They formed in medium-textured lake sediments on nearly level low lake terraces. Elevations range from 4,215 to 4,300 feet above sea level.

The surface layer is very dark grayish-brown, friable loam 7 to 12 inches thick. The subsoil is dark grayish-brown and grayish-brown, firm sandy clay loam or clay loam. Depth to a lime-cemented hardpan ranges from about 12 to 40 inches.

Terminal soils are near the Payson, Airport, and Warm Springs soils. The native vegetation is mainly a sparse stand of greasewood and saltgrass and an abundant stand of pepperweed, cheatgrass brome, buckwheat, and other annuals.

Terminal soils are used mainly as range.

Terminal loam (Ta).—This soil is on a slightly undulating low lake terrace in the southern part of the survey area, mainly about one-half mile northwest of North Salt Lake in Davis County. In most places, slopes are less than 1 percent.

A representative profile:

0 to 10 inches, very dark grayish-brown loam; friable; platy structure; slightly calcareous; mildly alkaline to neutral.
10 to 14 inches, dark grayish-brown sandy clay loam; friable; columnar structure; moderately calcareous; moderately alkaline.
14 to 22 inches, grayish-brown sandy clay loam; firm; platy structure; strongly calcareous; moderately alkaline.
22 to 24 inches, light brownish-gray, lime-cemented hardpan; extremely hard; strongly calcareous; strongly alkaline.
24 to 72 inches, light olive-gray and brown silty clay loam; very firm; massive; strongly and very strongly calcareous; strongly alkaline.

The surface layer is 7 to 12 inches thick. Depth to the hardpan ranges from about 13 to 40 inches, and the thickness of the pan ranges from about 2 to 6 inches. In places there are two separate hardpan layers. This soil is moderately affected by salts and alkali. Depth to the water table generally is 36 to 48 inches.

Included with this soil in the mapping were a few small areas of clay and of fine sandy loam that do not have a hardpan.

This soil is somewhat poorly drained and is very slowly permeable. It holds about 1.8 inches of available water per foot of soil above the hardpan, or about 2.5 to 3 inches to the top of the pan. Roots do not penetrate the pan. Runoff is slow, and the hazard of erosion is none to slight.

All of this soil is used as range. (Capability unit VIw–1; Alkali Bottom range site)

Timpanogos Series

The Timpanogos series consists of deep, well-drained soils on nearly level to steep lake terraces. These soils formed in medium-textured lake sediments that have been somewhat reworked by wind. Elevations range from 4,300 to 5,100 feet above sea level.

The surface layer is very dark brown or very dark grayish-brown, friable loam that ranges from about 8 to 22 inches in thickness. The subsoil is dark-brown, firm heavy loam that has subangular blocky structure. The substratum is brown to dark-brown or yellowish-brown, friable, massive fine sandy loam or loam. Lime has been leached from the surface layer and upper part of the subsoil and has been deposited in the lower part of the subsoil or the upper part of the substratum.

Timpanogos soils are near the Parleys, Kidman, Hillfield, and Francis soils. The native vegetation is mainly brushy Gambel oak, bunch grasses, and sagebush.

Timpanogos soils are used extensively for irrigated general crops.

Timpanogos loam, 3 to 6 percent slopes (TbC).—This soil is in widely distributed areas on high lake terraces, mainly in the east-central part of the survey area. In most places slopes are 4 or 5 percent.

A representative profile:

0 to 15 inches, very dark-brown loam; friable; granular structure; noncalcareous; mildly alkaline.
15 to 27 inches, dark-brown heavy loam; friable; subangular blocky structure; noncalcareous; neutral.
27 to 39 inches, dark-brown loam; friable; massive; very strongly calcareous; moderately alkaline.
39 to 60 inches, yellowish-brown fine sandy loam; friable; massive; strongly calcareous; moderately alkaline.

The surface layer ranges from about 12 to 18 inches in thickness. In places a small amount of this layer is

fine gravel. In places the substratum is stratified loam, fine sandy loam, and loamy fine sand.

Included with this soil in the mapping were small areas of fine sandy loam and clay loam. Also included were areas of Timpanogos loam, 6 to 10 percent slopes, eroded.

This soil is well drained and is moderately permeable. It holds about 2 inches of available water per foot of soil, or about 10 inches to a depth of 5 feet. Roots penetrate deeply. Natural fertility is high. Runoff is medium, and the hazard of erosion is moderate. The soil generally is in good tilth and is easy to work.

This soil is used extensively for irrigated general farming. The main crops are alfalfa, small grains, peaches, cherries, and apricots. This soil is well suited to orchard fruits. It is also well suited to irrigated improved pasture and hay. (Capability unit IIIe–2; not used for range)

Timpanogos loam, 0 to 1 percent slopes (TbA).—This soil is on the broad, smooth, nearly level lake terraces. It occurs with Parleys loam and Kidman fine sandy loam. This soil is nearly level; otherwise, it is similar to Timpanogos loam, 3 to 6 percent slopes. The surface layer is about 15 to 20 inches thick.

Included with this soil in the mapping were some small areas of Timpanogos loam, 1 to 3 percent slopes, and areas of fine sandy loam. Also included was approximately 200 acres about one-half mile north of Riverdale that has a gravelly substratum below a depth of 36 inches, and some areas that have a fluctuating water table and distinct brownish-yellow mottles at a depth of about 36 to 48 inches.

Runoff is slow, and the hazard of erosion is none to slight.

This soil is irrigated and is used extensively for general farming. Row crops grown are sugarbeets, corn, tomatoes, and potatoes; close-growing crops are alfalfa and small grains; and orchard fruits are peaches, apricots, and cherries. The most needed management is land leveling so that irrigation water can be distributed evenly. (Capability unit I–1; not used for range)

Timpanogos loam, 1 to 3 percent slopes (TbB).—This soil is on gently sloping smooth lake terraces. It occurs mainly with other Timpanogos soils and with Parleys loam, 1 to 3 percent slopes. This soil is similar to Timpanogos loam, 3 to 6 percent slopes, but it is less sloping. The surface layer is 14 to 20 inches thick. Runoff is slow to medium, and the hazard of erosion is slight.

Included with this soil in the mapping were a few small areas of Timpanogos loam, 3 to 6 percent slopes, and areas of fine sandy loam and of clay loam. Also included were some areas that have a water table between a depth of 40 and 48 inches.

This soil is irrigated and used for irrigated alfalfa, small grains, corn, and sugarbeets, and for irrigated tomatoes, potatoes, and some orchard fruits. This soil is well suited to irrigation and to many kinds of crops. (Capability unit IIe–2; not used for range)

Timpanogos loam, 6 to 10 percent slopes, eroded (TbD2).—This soil is on strongly sloping high lake terraces, terrace escarpments, and ridges. It is steeper and more eroded than Timpanogos loam, 3 to 6 percent slopes. The surface layer ranges from about 8 to 16 inches in thickness.

Included with this soil in the mapping were a few small areas of lighter colored silt loam and areas of clay loam.

Runoff is medium to rapid and depends on the kind and amount of cover and on the condition of the soil. The hazard of erosion is moderate to high.

This soil is used for irrigated farming, for dryfarming, and as range. Irrigated crops are mainly cherries, peaches, apricots, alfalfa, and small grains. This soil is well suited to orchards and to irrigated improved pasture. (Capability unit IIIe–3; Upland Loam range site)

Timpanogos loam, 10 to 20 percent slopes, eroded (TbE2).—This soil has moderately steep north- and northeast-facing slopes on lake terraces, terrace escarpments, and ridges. It is much steeper and more eroded than Timpanogos loam, 3 to 6 percent slopes. The surface layer is about 8 to 12 inches thick.

Included with this soil in the mapping were some small areas of other Timpanogos soils. Also included were areas of lighter colored silt loam and areas of clay loam.

Runoff is medium to rapid and depends on the amount and kind of vegetation and on soil conditions. The hazard of erosion is high. Natural fertility is moderately high.

This soil is used mainly for dryfarming, but it is well suited to orchards and to improved pasture. Sprinkler irrigation permits the most efficient use of water and is less likely to cause erosion than other methods. (Capability unit IVe–4; Upland Loam range site)

Timpanogos Series, Noncalcareous Variants

The noncalcareous variants from the normal Timpanogos soils are deep, well drained, and medium textured. These strongly sloping to moderately steep soils are on alluvial fans on high lake terraces in the vicinity of North Ogden. They formed in noncalcareous, medium-textured alluvium that was derived from gneiss, schist, argillite, and quartzite. Elevations range from about 4,600 to 5,150 feet above sea level.

The surface layer is very dark grayish-brown or dark-brown, friable very fine sandy loam 7 to 13 inches thick. The subsoil is dark yellowish-brown, firm, subangular blocky very fine sandy loam. The substratum is dark yellowish-brown, friable, massive loam and very fine sandy loam.

These noncalcareous variants are near the Ackmen, Draper, Francis, Pleasant View, and Ridd soils. The native vegetation is mainly sagebrush, western wheatgrass, Indian ricegrass, three-awn, and cheatgrass brome.

The noncalcareous variants from the normal Timpanogos soils are used as range and for dryfarming.

Timpanogos very fine sandy loam, noncalcareous variant, 10 to 20 percent slopes (TcE).—This soil is inextensive. It occurs on the upper part of strongly sloping or rolling alluvial fans about 1 mile northeast of Pleasant View.

A representative profile:

0 to 7 inches, very dark grayish-brown very fine sandy loam; friable; granular structure; neutral.

7 to 12 inches, dark-brown very fine sandy loam; friable; subangular blocky structure; slightly acid.

12 to 31 inches, dark yellowish-brown very fine sandy loam; firm; subangular blocky structure; neutral or slightly acid.

31 to 48 inches, dark yellowish-brown light loam; friable; subangular blocky structure; slightly acid.
48 to 73 inches, dark yellowish-brown very fine sandy loam; friable; massive; neutral.

The surface layer ranges from about 7 to 10 inches in thickness and from very fine sandy loam to loam in texture.

Included with this soil in the mapping were areas of loam.

This soil is well drained and moderately permeable. It holds about 2 inches of available water per foot of soil, or about 10 inches to a depth of 5 feet. Roots penetrate to a depth of 48 inches or more. Runoff is medium to rapid, depending on the degree of slope and the kind and amount of vegetation, and the hazard of erosion is moderate to high. This soil is friable and easy to work.

This soil is used mostly as range, but about 20 acres is dryfarmed for wheat. It is suited to peach, apricot, and cherry orchards and to irrigated improved pasture. Sprinkler irrigation permits the most efficient use of water and is less likely to cause erosion than other methods. (Capability unit IVe–4; Upland Loam range site)

Timpanogos very fine sandy loam, noncalcareous variant, 6 to 10 percent slopes (TcD).—This soil is inextensive. It occurs on sloping or gently undulating alluvial fans. It is similar to Timpanogos very fine sandy loam, noncalcareous variant, 10 to 20 percent slopes, except that it is less sloping. The surface layer ranges from about 9 to 13 inches in thickness.

Included with this soil in the mapping were small areas of somewhat poorly drained loam. Also included were areas that have a loam surface layer.

Runoff is medium, and the hazard of erosion is moderate.

Most of this soil is used for dryfarmed wheat and for irrigated cherries, peaches, and apricots, crops that are well suited. This soil is also suited to irrigated improved pasture. (Capability unit IIIe–3; Upland Loam range site)

Timpanogos variant-Draper complex, 3 to 10 percent slopes (TDD).—This complex occurs on south-facing alluvial fans in the vicinity of North Ogden. About 65 percent of the complex is Timpanogos very fine sandy loam, noncalcareous variant, 6 to 10 percent slopes; and about 35 percent is Draper loam, drained, 3 to 6 percent slopes. The Timpanogos soil is on slight knolls or ridges, and the Draper soil is in slight depressions, swales, or drainageways. The Timpanogos variant in this complex is similar to Timpanogos very fine sandy loam, noncalcareous variant, 10 to 20 percent slopes, but it is less sloping. The surface layer in most places is 9 to 13 inches thick, but on some ridgetops erosion has reduced this thickness to 7 or 8 inches. The Draper soil in this complex is similar to Draper loam, drained, 0 to 1 percent slopes, but is more sloping. Its surface layer is about 10 to 20 inches thick, which is somewhat thinner than that of the less sloping soil.

Included with this complex in mapping were a few, small, somewhat poorly drained areas of moderately coarse textured soils.

About 50 percent of the acreage in this complex is used for community developments. These developments are expanding rapidly. Cultivated areas are used for both dryfarmed and irrigated crops. The main crops are alfalfa, cherries, apricots, and peaches. This complex is also well suited to irrigated improved pasture. (Both soils are in capability unit IIIe–3; Timpanogos variant is in Upland Loam range site; Draper soil is in Semiwet Meadow range site)

Trenton Series

The Trenton series consists of deep, moderately well drained and somewhat poorly drained, gently sloping to strongly sloping soils that are moderately affected by salts and alkali. These soils formed in medium-textured lake sediments on lake terraces.

The surface layer is very dark brown, friable silt loam 4 to 10 inches thick. The subsoil is brown and dark-brown, very firm clay loam, silty clay loam, and silty clay that has prismatic structure. The substratum is brown, firm, massive silty clay loam or heavy silt loam.

Trenton soils are near the Parleys soils. The native vegetation consists of greasewood, gumweed, and cheatgrass brome.

In the Davis-Weber Area, Trenton soils are of limited extent and are used mainly for irrigated crops. Small, strongly sloping areas are used for grazing.

Trenton silt loam, 1 to 3 percent slopes, eroded (TrB2).—This soil is on a gently sloping lake terrace about 2 miles north of Layton in Davis County. Slopes are relatively short and in most places are about 3 percent. This soil occurs mainly with Parleys loam.

A representative profile:

0 to 4 inches, very dark brown silt loam; friable; platy structure; noncalcareous; neutral.
4 to 7 inches, dark-brown clay loam; firm; prismatic structure; noncalcareous; mildly alkaline.
7 to 13 inches, dark-brown silty clay; very firm; prismatic structure; noncalcareous; mildly alkaline.
13 to 33 inches, brown silty clay loam; friable; prismatic structure; strongly calcareous; moderately alkaline.
33 to 60 inches, brown, stratified silty clay loam and silty loam; friable; moderately calcareous; strongly alkaline.

The surface layer is generally 4 to 6 inches thick, but in a few, narrow, gullied areas, water erosion has removed the original surface layer. This soil is moderately affected by salts and alkali.

Included with this soil in the mapping was a small area in a depression that has a high water table and that is moderately affected by salts and alkali. This included area is about 2 acres in size.

This soil is moderately well drained and is very slowly permeable. It holds about 1.6 inches of available water per foot of soil, or about 8 inches to a depth of 5 feet. Only a few roots penetrate the fine-textured part of the subsoil. Natural fertility is moderately low. Runoff is medium to moderately rapid, and the hazard of erosion is moderate. This soil is generally in poor tilth and is difficult to work.

Most of this soil is used for irrigated crops, mainly alfalfa, small grains, and corn. Yields are only fair. Reclamation, land leveling, and distributing irrigation water evenly are important concerns of management. (Capability unit IVw–3; Alkali Bottom range site)

Trenton silt loam, 3 to 10 percent slopes, severely eroded (TrC3).—This soil occupies a small acreage in the survey area. It occurs mainly with the Parleys soils.

This soil is similar to Trenton silt loam, 1 to 3 percent slopes, but it is steeper, more eroded, and gullied.

Included with this soil in the mapping were areas of silty clay loam. This soil is of limited use for grazing in fall in areas where the adjacent soils are grazed after cultivated crops are harvested. (Capability unit VIw–1; Alkali Bottom range site)

Warm Springs Series

The Warm Springs series consists of deep, somewhat poorly drained, nearly level or gently sloping soils that are slightly to strongly affected by salts and alkali. These soils formed in medium-textured mixed lake sediments on low lake terraces. Elevations range from about 4,210 to 4,400 feet above sea level.

The surface layer is very dark grayish-brown, friable fine sandy loam 6 to 12 inches thick. The subsoil is grayish-brown or light brownish-gray, friable, massive heavy fine sandy loam. The substratum is light brownish-gray, very friable, stratified fine sandy loam, loamy fine sand, silt loam, and loam.

Warm Springs soils are commonly near the Syracuse, Ford, Leland, Airport, Payson, and Kidman soils. The native vegetation is mainly saltgrass, alkali sacaton, foxtail barley, and annual weeds.

Drained areas of Warm Springs soils are used extensively for irrigated general crops. Undrained areas are used as range.

Warm Springs fine sandy loam, 0 to 1 percent slopes (WaA).—This soil is extensive. It is on broad, low, nearly level lake terraces mainly in the west-central part of the survey area. It occurs commonly with Syracuse loamy fine sand.

A representative profile:

0 to 8 inches, very dark grayish-brown fine sandy loam; friable; platy structure; moderately calcareous; mildly alkaline.

8 to 15 inches, dark grayish-brown heavy fine sandy loam; friable; massive; strongly calcareous; very strongly alkaline.

15 to 37 inches, grayish-brown to light brownish-gray heavy fine sandy loam; friable; massive; strongly calcareous; very strongly alkaline.

37 to 60 inches, light brownish-gray loamy fine sand; very friable; massive; strongly calcareous; very strongly alkaline.

The surface layer ranges from about 8 to 12 inches in thickness. In most places the water table is below a depth of 3 feet. This soil is slightly to moderately affected by salts and alkali.

Included with this soil in the mapping were a few small areas of loamy fine sand and of silty clay loam. Also included were areas of light loam and of light silt loam.

This soil is somewhat poorly drained and is moderately permeable. It holds about 1.7 inches of available water per foot of soil, or about 8 inches to a depth of 5 feet. Roots penetrate deeply in drained areas. Natural fertility is moderately high. Runoff is slow. The hazard of erosion by water is none to slight, and there is a slight hazard of soil blowing. This soil generally is in good tilth, is easy to work, and can be tilled within a fairly wide range of moisture content.

This soil is used mainly for irrigated general crops of alfalfa, corn, small grains, sugarbeets, and tomatoes. Where it is adequately drained, this soil is well suited to irrigation and to many kinds of crops. (Capability unit IIw–3; not used for range)

Warm Springs fine sandy loam, 1 to 3 percent slopes (WaB).—This soil mainly has slopes of about 2 percent, and only in a few places are slopes as much as 3 percent; otherwise, it is similar to Warm Springs fine sandy loam, 0 to 1 percent slopes.

This soil is used for irrigated general crops of alfalfa, corn, small grains, sugarbeets, and tomatoes. Maintaining adequate drainage and leaching away salts are the main concerns of management. (Capability unit IIw–4; not used for range)

Warm Springs fine sandy loam, deep over clay, 0 to 1 percent slopes (WdA).—This soil occurs on nearly level low lake terraces, commonly with Airport silt loam. It is similar to Warm Springs fine sandy loam, 0 to 1 percent slopes, but has a slowly permeable layer of clay at a depth of 30 to 36 inches.

Included with this soil in the mapping were a few small areas of silty clay loam.

This Warm Springs soil is used mainly for irrigated crops. Most areas have been drained, and the water table is below a depth of 30 inches. Adequately drained areas are well suited to small grains and corn, to irrigated improved pasture, and to grass-legume hay. (Capability unit IIIw–6; not used for range)

Warm Springs fine sandy loam, strongly alkali, 0 to 1 percent slopes (WgA).—This extensive soil occurs mainly in slight depressions on the lower part of low lake terraces. It is similar to Warm Springs fine sandy loam, 0 to 1 percent slopes, but is strongly affected by alkali, mainly in the subsoil and substratum. The surface layer is 6 to 10 inches thick. Depth to the water table is commonly 24 to 40 inches.

Included with this soil in the mapping were small areas that have slopes of 1 to 3 percent.

This soil is used mainly as range, but a few areas are used for irrigated crops. Because of the alkali, growth of crops is uneven and spotty, and yields are low. Where this soil is drained and reclaimed from damage by alkali, it is suited to irrigated improved pasture and grass-legume hay. It is also suited to corn and small grains. (Capability unit IIIw–6; Alkali Bottom range site)

Warm Springs fine sandy loam, shallow water table, 0 to 1 percent slopes (WlA).—This inextensive soil occurs in drainageways and depressions of low lake terraces. It is similar to Warm Springs fine sandy loam, 0 to 1 percent slopes, but its water table is at or near the surface and its surface layer is darker colored.

This soil is used as unimproved pasture. Drainage is required before irrigated crops can be grown. Areas that are drained and reclaimed are suited to irrigated improved pasture. (Capability unit IVw–1; Salt Meadow range site)

Warm Springs fine sandy loam, strongly alkali, 0 to 1 percent slopes, channeled (WhA).—This soil is on low lake terraces that border the lake plain. It is dissected by many channels 2 to 4 feet deep. These are channels of meandering streams that have cut from the lake plain back into the terraces. Many blowouts add to the un-

evenness of the surface. Except for this unevenness and the strong concentration of alkali, this soil is similar to Warm Springs fine sandy loam, 0 to 1 percent slopes. The surface layer is 6 to 8 inches thick. Erosion is a moderate hazard.

Included with this soil in the mapping were a few small areas of very salty silty clay loam and silt loam.

The many channels and blowouts make cultivation of this soil impractical. All the acreage is used as range, but yields of herbage are low. (Capability unit VIw–1; Alkali Bottom range site)

Wayment Series

The Wayment series consists of deep, poorly drained, salty soils on nearly level low flood plains. These soils formed in moderately fine textured mixed alluvium. Elevations range from 4,208 to 4,215 feet above sea level.

The surface layer is very dark grayish-brown or dark grayish-brown, firm silty clay loam about 3 to 12 inches thick. The subsoil is brown, dark-brown, or dark grayish-brown, firm silty clay loam or heavy silt loam. The substratum is brown to dark-brown, firm to friable, stratified silty clay loam, silt loam, and loam. A high concentration of soluble salts occurs throughout the profile.

Wayment soils occur near the Refuge soils. Where it occurs, the native vegetation is a scattered growth of saltgrass and pickleweed and of tules and other rushes, but many areas are barren.

Wayment soils are used mainly as wildlife habitat, though much of the acreage is barren.

Wayment silty clay loam (Wm).—This nearly level soil occurs on low flood plains of the Weber River that border Great Salt Lake in the northwestern part of the survey area.

A representative profile:

0 to 3 inches, very dark grayish-brown silt loam; firm; massive; moderately calcareous, mildly alkaline.
3 to 9 inches, dark grayish-brown silty clay loam; firm; massive; moderately calcareous; moderately alkaline.
9 to 24 inches, dark grayish-brown silt loam; firm; massive; moderately calcareous; moderately alkaline.
24 to 63 inches, brown silty clay loam and loam; friable; massive; moderately calcareous; moderately alkaline.

This soil has a high content of soluble salts throughout the profile. In most places a thin crust of salts is on the surface.

Included with this soil in the mapping were small areas of loam and silt loam.

This soil is poorly drained and has slow to moderate permeability. The water table is at or near the surface most of the time. Runoff is very slow to ponded, and the hazard of erosion is none to slight.

This soil has limited use as habitat for wildlife. Reclamation is extremely difficult because this soil is low and has few drainage outlets. (Capability unit VIIIw–1; not suited to range)

Wayment-Refuge complex (WR).—This large complex of soils is on nearly level low flood plains of the North Fork Weber River and in the extreme northwestern part of the survey area. About 60 percent of the acreage is Wayment silty clay loam, and about 40 percent is Refuge loam. Areas of these soils are so intermingled that they cannot be shown separately on a publishable soil map.

The Wayment soil in this complex is similar to the Wayment silty clay loam described under the Wayment series. This soil generally occurs in depressions. It has a thin crust of salts on the surface and is nearly barren.

The Refuge soil in this complex is similar to Refuge loam described under the Refuge series. This soil is in slightly higher positions and is somewhat poorly drained. It is medium textured, is highly stratified, and has a high concentration of salts below a depth of 20 inches. In most places this soil has a cover consisting mainly of peppergrass, saltgrass, alkali sacaton, and foxtail barley.

The soils of this complex have a high water table and slow to moderately rapid permeability. Runoff is slow to ponded, and the hazard of erosion is none to slight.

These soils have limited use for grazing and as wildlife habitat. The Refuge soil can be made more productive by seeding selected grasses. (Wayment soil is in capability unit VIIIw–1; Refuge soil is in capability unit IVw–3; not suited to range)

Woods Cross Series

The Woods Cross series consists of deep, poorly drained, nearly level to gently sloping soils on flood plains. These soils formed in fine-textured, noncalcareous to slightly calcareous alluvium. Elevations range from 4,250 to 4,500 feet above sea level.

The surface layer is black or very dark gray, friable silty clay loam 5 to 12 inches thick. The subsoil is black or very dark gray, firm heavy silty clay loam. The substratum is gray, firm silty clay or silty clay loam. Throughout the profile, these soils are noncalcareous or only slightly calcareous.

Woods Cross soils are near the Chance, Draper, Ironton, and Logan soils. The native vegetation consists of sedges, reeds, Kentucky bluegrass, saltgrass, and clover.

Drained areas of Woods Cross soils are used for irrigated general crops; undrained areas are used for pasture and native hay.

Woods Cross silty clay loam, drained (Wt).—This soil occurs in low positions on nearly level flood plains. It is mainly near Woods Cross in Davis County, but smaller areas are near North Ogden in Weber County. This soil formed in areas where the water table was continuously high. Tile drains have now lowered the water table below a depth of 3 feet. Slopes range from 0 to 3 percent.

A representative profile:

0 to 6 inches, black silty clay loam; friable; fine granular structure; very slightly calcareous; mildly alkaline.
6 to 37 inches, black heavy silty clay loam; firm; subangular blocky structure; very slightly calcareous; mildly alkaline.
37 to 72 inches, gray silty clay; firm; subangular blocky structure; noncalcareous; mildly alkaline.

The surface layer is about 5 to 10 inches thick. The water table fluctuates but is generally below a depth of 3 feet. Distinct mottles of yellowish brown occur below the surface layer. The substratum is silty clay or silty clay loam, but in places it is stratified with loamy material.

Included with this soil in the mapping were small areas of loam and a few small areas of calcareous silty clay loam.

This soil is poorly drained and is slowly permeable. It holds about 2.2 inches of available water per foot of soil, or about 12 inches to a depth of 5 feet. Roots penetrate to the water table. Natural fertility is moderately high. Runoff is very slow, and the hazard of erosion is none to slight. Tillage of this soil is somewhat difficult. It can be worked only within a narrow range of moisture content and should be plowed in fall.

Much of this soil is used for irrigated crops, mainly sugarbeets, alfalfa, small grains, corn, and truck crops. Where it is adequately drained, this soil is well suited to many kinds of irrigated crops. (Capability unit IIIw–2; not used for range)

Woods Cross silty clay loam (Ws).—This soil occurs in slight depressions on nearly level flood plains. The water table commonly is about 10 to 18 inches from the surface. This soil is similar to Woods Cross silty clay loam, drained, but it has a higher water table. The surface layer is about 6 to 12 inches thick.

This soil is used only for native pasture and hay. It is not suited to irrigated crops, unless it is adequately drained. (Capability unit IIIw–2; Wet Meadow range site)

Formation, Morphology, and Classification of Soils

This section consists of two main parts. In the first part, the important factors of soil formation are discussed. In the second part, the soil series are first classified in table 10 according to the current system of classification; then the soils are placed in the order and great soil group of the older system that was adopted in 1938 and later revised, and the profile of a soil representative of that group is described.

Factors of Soil Formation

Soils are formed by the interaction of (1) climate; (2) vegetation and other living organisms; (3) parent material; (4) relief, or lay of the land; and (5) time. The characteristics of the soil at any point on earth depend on the combined influence of these five factors at that point. The importance, or the effect, of each factor differs from place to place.

The soils in the Davis-Weber Area were formed by the interaction of all five of these factors, but parent material and relief probably have had the greatest influence in determining the kinds of soil that formed. For example, soils formed on high lake terraces are well drained and are leached of soluble salts, whereas soils formed on low lake terraces are generally somewhat poorly drained or poorly drained, contain a large amount of soluble salts, and are calcareous throughout their profile. Differences in the texture of the parent materials, which were deposited during Pleistocene geologic age in Lake Bonneville, have resulted in the formation of soils that have widely different textures.

The effect of time on soil formation is reflected in the degree of horizonation of soils. Distinct soil horizons occur in the soils on lake terraces and other of the older landforms, but young soils on the flood plains of the Weber River show only a darkening of the surface layer and little horizon development. The effect of vegetation on soil formation, though important, has been controlled in the survey area largely by drainage and the climate.

Climate

The climate of the Davis-Weber Area ranges from dry subhumid to moist subhumid. The western part of the area is the driest. Rainfall increases toward the east, and the area is wettest along the mountains in the eastern part. The average annual temperature is fairly uniform throughout the survey area. A uniform, moderately long, frost-free period is a result of air drainage from the canyons and down the front of the mountains and the moderating effect of Great Salt Lake.

The climate is characterized by warm dry summers, cold moist winters, and cool moist springs. The mean annual precipitation at Farmington station in Davis County is about 20 inches, and at the Ogden Sugar Factory station in Weber County it is about 16 inches. The heaviest rainfall occurs during winter and spring; the lightest is during summer. June, July, and August are the driest months.

Recorded frost data show a fairly uniform frost-free period for the survey area. At Farmington this period is 157 days; at the Riverdale Power House in Weber County, 160 days; and at Ogden Power House, 155 days. In the western part of the area near Great Salt Lake, the frost-free period is at least as long as it is in other parts of the area.

Much of the rain and snow that falls during winter and early in spring can be stored in the soil because evapotranspiration is very low during this period. Records at Farmington show that the average annual precipitation during 5 months of this period is about 10 inches. If all of this water entered the soil, it would be enough during average years to fill the medium-textured soils to field capacity to a depth of about 5 feet. During years of above-average precipitation, the water percolates deeper than 5 feet in the sandy and gravelly soils. Excess water commonly percolates into the ground water basin. The precipitation at Farmington is representative of that in an area along the base of the mountains where Kilburn and Ridd soils are dominant. Soluble materials, including carbonates, have been leached from these soils, and they are neutral to slightly acid. Although the precipitation is slightly less on the broad lake terraces, the well drained and moderately well drained soils that originally contained carbonates in the surface layers are leached. These carbonates have been moved downward in the profile by percolating waters. Consequently, the A horizon and upper part of the B horizon of these soils, mainly the Timpanogos and Parleys, are essentially free of carbonates. These soils have an accumulation of carbonates generally below a depth of 2 feet. In addition to the carbonates, some silicate clay has also been moved downward into the B horizon and has formed thin films on the ped surfaces.

The soils on the lower lake terraces and flood plains have received runoff from higher lands in addition to the normal rainfall. Also, some soils have received addi-

tional water from rising ground water. In many places this additional moisture has raised the water table and impaired drainage. The Logan, Ironton, Warm Springs, and similar soils have developed under these conditions.

Vegetation and other living organisms

According to available information, the native vegetation of the survey area at the time of settlement by white men was dominantly perennial grasses. On the well-drained soils on uplands, perennial grasses made up 65 to 85 percent of the plant cover. Brushy Gambel oak, bitterbrush, snowberry, big sagebrush, and other shrubs, although conspicuous in the area, made up only about 10 to 20 percent of the cover. Under this grass-type vegetation soils were formed that have a dark colored surface layer that contained a moderate amount of organic matter. Most areas of these soils are now cultivated. The dominance of grass cover on the formation of soils is even more noticeable on the somewhat poorly drained and poorly drained soils that are relatively free of salts and alkali. For example, the Logan and Roshe Springs soils have a thick, black surface layer that contains a large amount of organic matter.

Saltgrass and alkali sacaton commonly grow on soils that are moderately and strongly affected by salts and alkali. Examples are the Leland and Payson soils. On these soils the surface layer has not been appreciably darkened, because the growth of grasses is scant and the annual addition of organic matter is low.

On the flood plain of the Weber River, the vegetation consisted mainly of cottonwood and boxelder trees and an understory of willows, rose bushes, and bunch grasses. Under this vegetation, the moderately well drained and somewhat poorly drained soils in alluvium have developed a dark-colored surface layer that is similar in color and in content of organic matter to that of the well-drained soils on uplands. Examples are the Steed, Martini, and Sunset soils.

Soils on the plain bordering Great Salt Lake are about 95 percent barren and have only a scattering of samphire, pickleweed, and other salt-tolerant plants. The Saltair and Lakeshore soils developed on this plain. They have very thin or no A1 horizons.

Parent material

Most of the soils in the Davis-Weber Area formed in parent materials either deposited by streams in ancient Lake Bonneville and sorted by the action of lake water or deposited during the post-Bonneville period as alluvium on flood plains of the major streams or as alluvial fans. The main source of these materials was the drainage basin of the Weber River. Only a relatively small amount came from other drainage basins along the Wasatch Mountains. The kind of parent materials brought in is indicated by the rock formations exposed along the Weber River. These rocks included sandstone, siltstone, shale, quartzitic sandstone, conglomerate, limestone, and volcanic tuff (*6*).

The parent materials that were carried into the lake by the Weber River and other smaller streams were sorted by action of the lake water. In this sorting, the coarser sediments were deposited near the mouth of the canyons, and the finer particles were carried farther into the lake. The sorting of materials continued by water along the shoreline, and later, after the water had receded, the coarser sediments were extensively modified by wind action.

The Preston and Francis are examples of soils formed in these coarse-textured, wind-modified sediments on the higher lake terraces. Kidman and Layton soils formed in the moderately coarse and coarse textured material on the lake terraces of intermediate height. Warm Springs and Syracuse soils formed in the medium-textured to coarse-textured material on the low lake terrace. The moderately fine textured sediments deposited in the lake are most extensive on the lower terraces and on the lake plain bordering Great Salt Lake. Airport, Leland, and Saltair are representative soils formed in these sediments. On the medium and high terraces, the sediments are dominantly medium textured and moderately fine textured and in most places are stratified. Parleys soils formed in the moderately fine textured sediments, and Timpanogos soils formed in the medium-textured sediments. The alluvium deposited in the post-Bonneville period by the Weber River on a broad flood plain in the northwestern part of the survey area provided parent material for the Martini, Steed, Sunset, Kirkham, Refuge, and Wayment soils. These materials range from moderately coarse to moderately fine in texture.

The alluvium of the post-Bonneville period that came mainly from canyons south of the Weber River in the Farmington Mountains was derived mainly from weathered green schist, amphibolite, migmatite, granulite, and hornblende-biotite granite (*3*). These same rock formations occur in canyons north of the Weber River, but they also contain significant amounts of quartzite. Alluvium and colluvium from those rock formations provided the parent material for Kilburn soils.

In a few relatively small areas along the front of the Wasatch Mountains, limestone is the principal rock formation. In these areas alluvium and colluvium from weathered limestone form the parent material, and the soils that developed were either calcareous throughout or calcareous below the surface layer. Sterling soils developed in this parent material.

The benched area north of North Ogden and Pleasant View has complex geologic structure. A large thrust fault is exposed in this area, and there are outcrops of Cambrian limestone, quartzite, argillite, and shale (*5*). The Marriott gravelly sandy loam, calcareous variant, and Pleasant View soils developed in alluvium and colluvium that weathered from these rocks.

In the Little Mountain area, which is about 14 miles west of Ogden and near the shore of Great Salt Lake, the main formation is massive tillite (*4*). Tillite is hard, blackish-gray argillite or slate containing boulders, cobbles, and pebbles. These consist mainly of flesh-colored gneissoid granite and whitish-gray metaquartzite. The Barton soils developed in alluvium and residuum that weathered from tillite.

Relief or landform

The Davis-Weber Area is at elevations of about 4,200 to 5,600 feet above sea level. The present level of Great Salt Lake is about 4,200 feet. Most of the farming is at elevations ranging from 4,215 to 5,150 feet. The principal landforms in this survey area are (1) the broad

lake terraces and deltas that were built during the Pleistocene geologic period when Lake Bonneville occupied most of the area; (2) the post-Bonneville flood plain of the Weber River; (3) the coalescing and, in many places, overlapping alluvial and colluvial fans adjacent to the mountains; and (4) the lake plain of the Great Salt Lake.

The lake terraces are mainly nearly level to gently sloping, but moderate and strong slopes are common on terraces of medium height and on high terraces. Terrace breaks and escarpments are mainly strongly sloping to steep. The Timpanogos, Parleys, and Kidman soils commonly occur on the broad, nearly level to gently sloping lake terraces; some of the Kilburn soils occur on the stream terraces and deltas; and the Hillfield and Marriott soils occur on the terrace escarpments.

On the lake terraces, soil drainage is closely associated with the height of the terrace. The soils on the medium and high terraces are mainly well drained or moderately well drained, and soils on low terraces are mainly somewhat poorly drained or poorly drained. Timpanogos loam, 1 to 3 percent slopes, is an example of well-drained soils on the high lake terraces, and Warm Springs fine sandy loam, 0 to 1 percent slopes, of somewhat poorly drained soils on low lake terraces.

The soils on the flood plain of the Weber River are mainly nearly level, but some areas near the river channel are undulating. These soils range from moderately well drained to poorly drained, and in places they are affected by a high water table. The Steed soils are well drained and moderately well drained. They occur near the river channel in the upper part of the river flood plain. Wayment soils are poorly drained. They occur on the lower portions of the stream flood plains.

The coalescing fans adjacent to the mountains are mainly sloping to steep. Kilburn soils are extensive on these fans. These soils are well drained to somewhat excessively drained.

The lake plain is level or nearly level. Saltair and Lakeshore soils are extensive on the lake plain. These soils are poorly drained and very poorly drained and are strongly affected by salts and alkali.

Time

The degree of development of soil horizons depends in part on the length of time the soil-forming factors have been at work. The time may be centuries or only a few years. Probably less than 10,000 years have passed since ancient Lake Bonneville was at its highest level, but the lake sediments have been exposed long enough for the development of distinct soil horizons. On the high and intermediate terraces where soils are well drained and moderately well drained, most of the soluble salts have been leached from the soil profile. In addition, carbonates have been moved downward from the A1 and B2 horizons and have formed B3ca and Cca horizons. Following the removal of the carbonates, some clay also has been moved downward from the A1 and deposited as thin films on surfaces of peds in the B2 horizon. The Timpanogos and Parleys are examples of soils on lake terraces that have been developing for a considerable but not extremely long period.

The lowest degree of horizonation among the soils of the survey area occurs in alluvial soils. Examples are the Steed and Martini soils. These soils occur on flood plains of the Weber River, and they periodically receive additional sediments from floodwaters. The time has been too short for genetic horizons to form in these soils, but some organic matter has accumulated in the surface layer to form an A1 horizon. No further development of horizons has occurred.

Classification of Soils

Soils are classified so that we can more easily remember their significant characteristics. Classification enables us to assemble knowledge about the soils, to see their relationships to one another and to the whole environment, and to develop principles that help us to understand their behavior and their response to manipulation. First, through classification and then through use of soil maps, we can apply our knowledge to specific fields and other tracts of land.

Thus in classification, soils are placed in narrow categories that are used in detailed surveys so that knowledge about the soils can be organized and applied in managing farms, fields, and ranches; in developing rural areas; in engineering work; and in many other ways. Soils are placed in broad classes to facilitate study and comparison in large areas, such as countries and continents.

Two systems of classifying soils have been used in the United States in recent years. The older system was adopted in 1938 (*2*) and later revised (*14*). The system currently used was adopted for general use by the National Cooperative Soil Survey in 1965. The current system is under continued study (*12, 18*). Therefore, readers interested in developments of this system should search the latest literature available. In this subsection some of the classes in the current system and the great soil groups of the older system are given for each soil series in table 10. The classes in the current system are briefly defined in the following paragraphs.

ORDER: Ten soil orders are recognized in the current system. They are Entisols, Vertisols, Inceptisols, Aridisols, Mollisols, Spodosols, Alfisols, Utisols, Oxisols, and Histosols. The properties used to differentiate the soil orders are those that tend to give broad climatic groupings of soils. Two exceptions, Entisols and Histosols, occur in many different climates.

Table 10 shows the five soil orders in the Davis-Weber Area—Mollisols, Aridisols, Alfisols, Entisols, and Inceptisols. Mollisols have surface layers darkened by organic matter. Aridisols are primarily soils of dry places. Alfisols have clay-enriched horizons with more than 35 percent base saturation. Entisols are mostly on young but not recent land surfaces and their profiles do not exhibit significant illuviation, eluviation, nor extreme weathering. Inceptisols are soils that are either without natural genetic horizons or have only the beginnings of horizons.

SUBORDER: Each order is subdivided into suborders, primarily on the basis of those soil characteristics that seem to produce classes having the greatest genetic similarity. The suborders narrow the broad climatic range permitted in the orders. The soil properties used to separate suborders mainly reflect either the presence or absence of waterlogging or soil differences resulting from the climate or vegetation.

TABLE 10.—*Soil series classified according to the current system of classification and the revised 1938 system*

Series	Current classification [1]			1938 classification	
	Family	Subgroup	Order	Great soil group	Order
Abbott	Fine, mixed, calcareous, mesic	Fluentic Haplaquepts	Inceptisols	Alluvial soils	Azonal soils.
Ackmen	Fine-loamy, mixed, mesic	Cumulic Haplustolls	Mollisols	Alluvial soils	Azonal soils.
Airport	Fine-silty, calcareous, mesic	Typic Natraquolls	Mollisols	Solonetz soils	Intrazonal soils.
Arave	Fine-loamy, mixed, mesic	Aquic Natrustalfs	Alfisols	Solonetz soils	Intrazonal soils.
Barton	Coarse-loamy, mixed, mesic	Typic Argiustolls	Mollisols	Chestnut soils	Zonal soils.
Chance	Coarse-loamy, mixed, non-calcareous, mesic.	Typic Haplaquolls	Mollisols	Humic Gley soils	Intrazonal soils.
Croy	Fine-loamy, mixed, mesic	Typic Nadurustalfs	Alfisols	Solonetz soils	Intrazonal soils.
Cudahy	Fine-silty, carbonatic, mesic	Petrocalcic Calciaquolls	Mollisols	Solonchak soils [2]	Intrazonal soils.
Draper	Fine-loamy, mixed, mesic	Aquic Cumulic Haplustolls.	Mollisols	Alluvial soils	Azonal soils.
Ford	Coarse-loamy, mixed, mesic	Aeric Calciaquolls	Mollisols	Solonchak soils [2]	Intrazonal soils.
Francis	Sandy, mixed, mesic	Entic Haploxerolls	Mollsiols	Regosols	Azonal soils.
Gooch	Fine-loamy, mixed, mesic	Aquic Calciorthids	Aridisols	Solonchak soils [2]	Intrazonal soils.
Harrisville	Fine-silty, mixed, mesic	Mollic Natrustalfs	Alfisols	Solonetz soils	Intrazonal soils.
Hillfield	Coarse-silty, mixed, mesic	Mollic Calciorthids	Aridisols	Calcisols	Intrazonal soils.
Ironton	Coarse-loamy, mixed, mesic	Cumulic Calciaquolls	Mollisols	Solonchak soils [2]	Intrazonal soils.
Kidman	Coarse-loamy, mixed, mesic	Typic Haplustolls	Mollisols	Chestnut soils	Zonal soils.
Kilburn	Loamy-skeletal, mixed, mesic	Typic Haploxerolls	Mollisols	Brunizems	Zonal soils.
Kirkham	Fine-silty, mixed, mesic	Aquic Haplustolls	Mollisols	Alluvial soils	Azonal soils.
Lakeshore	Coarse-silty, mixed, mesic	Typic Salorthids	Aridisols	Solonchak soils	Intrazonal soils.
Layton	Sandy, mixed, mesic	Entic Haplustolls	Mollisols	Chestnut soils	Zonal soils.
Leland	Fine-loamy, mixed, mesic	Typic Natrustalfs	Alfisols	Solonetz soils	Intrazonal soils.
Logan	Fine-silty, mixed, mesic	Typic Calciaquolls	Mollisols	Solonchak soils [2]	Intrazonal soils.
Marriott	Coarse-loamy, mixed, mesic	Typic Haplustolls	Mollisols	Chestnut soils	Zonal soils.
Marriott, calcareous variant.	Coarse-loamy, mixed, mesic	Typic Haplustolls	Mollisols	Alluvial soils	Azonal soils.
Martini	Coarse-loamy, mixed, mesic	Entic Haplustolls	Mollisols	Alluvial soils	Azonal soils.
Parleys	Fine-silty, mixed, mesic	Typic Argiustolls	Mollisols	Chestnut soils	Zonal soils.
Payson	Fine, mixed, mesic	Typic Natrustalfs	Alfisols	Solonetz soils	Intrazonal soils.
Pleasant View	Coarse-loamy, mixed, mesic	Cumulic Haplustolls	Mollisols	Alluvial soils	Azonal soils.
Preston	Sandy, siliceous, nonacid, mesic	Typic Normipsamments	Entisols	Regosols	Azonal soils.
Refuge	Coarse-loamy, mixed, mesic	Salorthidic Haplustolls	Mollisols	Solonchak soils	Intrazonal soils.
Ridd	Coarse-loamy, mixed, mesic	Typic Argixerolls	Mollisols	Brunizems	Zonal soils.
Roshe Springs	Fine-loamy, carbonatic, mesic	Typic Calciaquolls	Mollisols	Solonchak soils [2]	Intrazonal soils.
Saltair	Fine-silty, mixed, mesic	Typic Salorthids	Aridisols	Solonchak soils	Intrazonal soils.
Steed	Fragmental, mixed, mesic	Entic Haplustolls	Mollisols	Alluvial soils	Azonal soils.
Sterling	Loamy-skeletal, mixed, mesic	Typic Calciustolls	Mollisols	Calcisols	Intrazonal soils.
Sunset	Coarse-loamy, mixed, mesic	Aquic Haplustolls	Mollisols	Alluvial soils	Azonal soils.
Syracuse	Coarse-loamy, mixed, mesic	Aquic Haplustolls	Mollisols	Solonchak soils [2]	Intrazonal soils.
Terminal	Fine-loamy, mixed, mesic	Petrocalcic Natrustalfs	Alfisols	Solonetz soils	Intrazonal soils.
Timpanogos	Fine-loamy, mixed, mesic	Typic Argiustolls	Mollisols	Chestnut soils	Zonal soils.
Timpanogos, non-calcareous variant.	Fine-loamy, mixed, mesic	Typic Argixerolls	Mollisols	Brunizems	Zonal soils.
Trenton	Fine, mixed, mesic	Typic Natrustolls	Mollisols	Solonetz soils	Intrazonal soils.
Warm Springs	Fine-loamy, mixed, mesic	Typic Calciaquolls	Mollisols	Solonchak soils [2]	Intrazonal soils.
Wayment	Fine-silty, mixed, mesic	Typic Salorthids	Aridisols	Solonchak soils	Intrazonal soils.
Woods Cross	Fine, montmorillonitic, non-calcareous, mesic.	Cumulic Haplaquolls	Mollisols	Humic Gley soils	Intrazonal soils.

[1] Placement of some soil series in the current system of classification, particularly in families, may change as more precise information becomes available.

[2] Soils of this series have a high content of calcium carbonate, but a lower content of the more soluble salts than have other soils in this area that are classified as Solonchaks.

GREAT GROUPS: Soil orders are separated into great groups on the basis of uniformity in the kinds and sequence of major soil horizons and features. The horizons used to make separations are those in which clay, iron, or humus have accumulated or those that have pans interfering with growth of roots or movement of water. The features used are the self-mulching properties of clays, soil temperature, major differences in chemical composition (mainly calcium, magnesium, sodium, and potassium), and the like. The great group is not shown separately in table 10, because it is the last word in the name of the subgroup.

SUBGROUPS: Great groups are divided into subgroups, one representing the central (typic) segment of the group and others, called intergrades, that have properties of one great group and also one or more properties of another great group, suborder, or order. Subgroups may also be made in those instances where soil properties intergrade outside the range of any other great group, suborder, or order. The names of subgroups are derived by placing one or more adjectives before the name of the great group. An example is Typic Argiustolls.

FAMILY: Families are separated within subgroups primarily on the basis of properties important to the

growth of plants, or behavior of soils where used for engineering. Among the properties considered are texture, mineralogy, reaction, soil temperature, thickness of horizons, and consistence. An example is fine-loamy, mixed, mesic family of Aquic Natrustalfs.

SERIES: The series consists of a group of soils that formed from a particular kind of parent material and have genetic horizons that, except for texture of the surface soil, are similar in differentiating characteristics and in arrangement in the soil profile. Among these characteristics are color, structure, reaction, consistence and mineralogical and chemical composition.

New soil series must be established, and concepts of some established series, especially older ones that have been used little in recent years, must be revised in the course of the survey program across the country. A proposed new series has tentative status until review of the series concept at the State, regional, and national levels of responsibility for soil classification results in a judgment that the new series should be established. When this survey was sent to the printer, 17 of the soil series described in this publication had tentative status. They are the Barton, Croy, Cudahy, Francis, Hillfield, Ironton, Kidman, Kilburn, Layton, Marriott, Martini, Ridd, Roshe Springs, Steed, Syracuse, Timpanogos, Wayment, and Warm Springs. Subsequent to completion of the survey, it has been determined that the extent of the Croy soils is too small to warrant establishing the Croy series, and it has been dropped. The other series used in this survey have been established.

The older system of classification, which was adopted in 1938 (*2*) and later revised (*14*), placed the soils in six categories. Beginning with the broadest, the six categories are order, suborder, great soil group, family, series, and type. In the broadest category, the soils are grouped into three orders—zonal, intrazonal, and azonal.

In the following pages, the orders and great soil groups in the old system are briefly discussed, and the profile of a soil representative of each great soil group is described.

Zonal order

In the Davis-Weber Area, two great soil groups—Chestnut soils and Brunizems (Prairie soils)—are in the zonal order. These groups are described in the following paragraphs, and a minimal and medial profile of a soil representative of each group is described.

CHESTNUT SOILS

These are well drained and moderately well drained zonal soils that generally have a dark-brown surface horizon that grades to a lighter colored horizon underlain by a horizon of lime accumulation (*15*). These soils developed under grasses, forbs, and shrubs in a temperate subhumid climate.

In the Davis-Weber Area, Chestnut soils have a very dark brown or very dark grayish-brown A horizon, a weak to moderate B2 horizon, and strong B3ca and Cca horizons. These soils developed mainly in calcareous lake sediments. Soil formation probably started soon after these sediments were exposed by receding water of ancient Lake Bonneville. Soluble salts were leached from the surface layer and moved into lower parts of the profile. The more soluble salts were leached completely out of the profile. The less soluble carbonates were moved downward and concentrated in the B3ca or Cca horizon. After the carbonates were removed from the surface layer, some clay was also moved downward by percolating water and formed films and coatings on sand grains, in pores, and on ped faces in the developing B2 horizon. Organic matter accumulated mainly in the A horizons, but a small amount has accumulated in the B2 horizon. The average annual precipitation in areas where Chestnut soils developed is about 16 to 18 inches.

Two stages, or degrees, of profile development were recognized in the area. These stages are minimal, represented by Chestnut soils having a weak B2 horizon, and medial, represented by Chestnut soils having a moderate B2t horizon.

Chestnut soils with minimal development.—This stage is shown by a profile of Timpanogos loam, 3 to 6 percent slopes, 650 feet south and 850 feet east of the north quarter corner of section 26, T. 4 N., R. 1 W.:

Ap—0 to 6 inches, dark grayish-brown (10YR 4/2) loam, very dark brown (10YR 2/2) when moist; weak, fine, granular structure; soft, friable, nonsticky and nonplastic; plentiful fine roots; few fine pores; noncalcareous; mildly alkaline (pH 7.5); clear, smooth boundary; horizon 4 to 10 inches thick.

A12—6 to 15 inches, dark grayish-brown (10YR 4/2) loam, very dark brown (10YR 2/2) when moist; weak, fine, blocky structure; slightly hard, friable, nonsticky and slightly plastic; abundant fine roots; many medium to fine pores; noncalcareous; mildly alkaline (pH 7.5); gradual, smooth boundary; horizon 6 to 12 inches thick.

B2t—15 to 27 inches, brown (7.5YR 5/4) heavy loam, dark brown (7.5YR 3/4) when moist; moderate, medium, subangular blocky structure; hard, firm, slightly sticky and slightly plastic; plentiful fine roots; many medium and fine pores; few thin clay films on peds and in pores; noncalcareous; neutral (pH 7.3); clear, wavy boundary; horizon 10 to 18 inches thick.

C1ca—27 to 39 inches, brown (7.5YR 5/4) loam, dark brown (7.5YR 4/4) when moist; massive; hard, firm, slightly sticky and slightly plastic; few medium and fine pores; few fine roots; very strongly calcareous; moderately alkaline (pH 7.9); diffuse, smooth boundary; horizon 6 to 18 inches thick.

C2—39 to 60 inches +, very pale brown (10YR 7/4) fine sandy loam, yellowish brown (10YR 5/4) when moist; massive; soft, friable, nonsticky and nonplastic; few fine roots; few medium to fine pores; strongly calcareous; thin layers or veins of lime; moderately alkaline (pH 8.3).

Loam is the only type of Timpanogos soil mapped in the survey area. The A horizons are typically noncalcareous but are slightly calcareous in places. Their content of organic matter ranges from about 2 to 5 percent. The B2t horizon is medium textured and has clay films that range from thin and patchy to thin and continuous on ped surfaces. In most places the C1ca horizon is immediately below the B2t horizon and has a calcium carbonate equivalent ranging from about 15 to 45 percent. The C horizons range from loamy fine sand to silty clay loam in texture.

Soluble salts have been removed, and this Timpanogos soil generally has less than 1 millimho of electrical conductivity, Ec x 10^3 millimhos per cmo at 25° C., to a depth of 40 inches or more. In many places the profile is essentially free of soluble salts to a depth of 60 inches or more. Exchangeable sodium and potassium mainly increases as depth below 40 inches increases. Carbonates

have been almost completely removed from the A and B2t horizons and have accumulated in the B3ca and Cca horizons at a depth of about 20 to 30 inches. Organic matter has accumulated mainly in the upper 12 to 15 inches of the A horizons. Generally, the B2t horizon has redder hues, higher values, and brighter chromas than have the A horizons. The reddish color of the B2t is the result of an increase in the content of free iron oxide and of the accompanying formation of secondary clay minerals from the primary minerals of the parent materials. About 5 to 8 percent clay has been moved from the A horizons to the B2t horizon and has formed films, or coatings, on ped faces and in pores. Alkalinity generally shows a slight increase with depth. This soil is generally about neutral to mildly alkaline in the surface layer and ranges from mildly alkaline to strongly alkaline in the Cca and C horizons.

Barton, Kidman, Layton, and Marriott soils are other Chestnut soils in the survey area that have minimal profile development. Barton soils have a somewhat weaker development than Timpanogos soils, probably because rainfall is somewhat less where Barton soils occur. The Barton soils developed in gravelly, cobbly, and stony, medium-textured colluvium and residuum, dominantly from tillite. The differences in color between Timpanogos and Barton soils are less pronounced, and the Barton soils are very dark grayish brown or dark grayish brown. The Barton soils lack prominent horizons of carbonate accumulation, although the C horizons are generally calcareous below a depth of 30 inches.

Kidman, Layton, and Marriott soils are Chestnut soils that show the least profile development. These soils have noncalcareous A and B horizons but have an accumulation of lime in the Cca horizon. Kidman soils formed in moderately coarse textured lake sediments, and Layton soils formed in coarse textured sediments. Marriott soils are gravelly and moderately coarse textured. They formed on steep delta escarpments. A detailed description of a profile of Barton, Kidman, Layton, and Marriott soils is given under "Descriptions of Soil Series and Profiles" at the back of this survey.

Chestnut soils with medial development.—This stage is shown by a profile of Parleys loam, 0 to 1 percent slopes, 850 feet north and 700 feet west of the south quarter corner of section 14, T. 4 N., R. 1 W.:

Ap—0 to 6 inches, dark grayish-brown (10YR 4/2) loam, very dark brown (10YR 2/2) when moist; weak, fine, granular structure; soft, friable, slightly sticky and slightly plastic; plentiful fine roots; many fine pores; noncalcareous; neutral (pH 7.2); abrupt, smooth boundary; horizon 6 to 12 inches thick.

A12—6 to 15 inches, dark grayish-brown (10YR 4/2) loam, very dark brown (10YR 2/2) when moist; weak, fine, blocky structure; hard, friable, slightly sticky and slightly plastic; plentiful fine roots; common medium and fine pores; noncalcareous; neutral (pH 7.1); gradual, smooth boundary; horizon 0 to 12 inches thick.

B2t—15 to 26 inches, brown (10YR 5/3) clay loam, dark brown (10YR 3/3) when moist; moderate, medium, prismatic structure that breaks to strong, fine, subangular blocky structure; very hard, firm, sticky and plastic; plentiful fine roots in cleavage planes; few fine pores; common, thin, patchy clay films on horizontal and vertical ped faces; noncalcareous; neutral (pH 7.3); clear, wavy boundary; horizon 6 to 18 inches thick.

B3ca—26 to 33 inches, brown (10YR 5/3) silty clay loam, dark brown (10YR 4/3) when moist; weak, medium, prismatic structure that breaks to strong, fine, subangular blocky structure; very hard, firm, sticky and plastic; few fine roots; few fine pores; strongly calcareous; lime, disseminated and in veins; mildly alkaline (pH 8.0); gradual, wavy boundary; horizon 0 to 14 inches thick.

C1ca—33 to 48 inches, pale-brown (10YR 6/3) silt loam, brown (10YR 5/3) when moist; few, medium, distinct mottles of strong brown (7.5YR 5/6, dry); massive; hard, firm, sticky and plastic; few fine roots; common fine pores; strongly calcareous; mildly alkaline (pH 8.0); diffuse, wavy boundary; horizon 8 to 16 inches thick.

C2—48 to 60 inches, light-brown (7.5YR 6/4), stratified silty clay loam, very fine sandy loam, silty clay, and fine sand, brown (7.5YR 5/4) when moist; common, coarse, faint mottles of strong brown (7.5YR 5/6, dry); massive; hard, firm, sticky and plastic; few fine roots; few fine pores; strongly calcareous; mildly alkaline (pH 8.0).

Loam is the only type of Parleys soil mapped in the survey area. The A horizons are typically noncalcareous but are slightly calcareous in places. The content of organic matter in the A1 horizon ranges from about 2 to 6 percent. The texture of the B2t horizon is generally clay loam, but it ranges from sandy clay loam to silty clay loam.

Thin, continuous clay films are on ped faces in the B2t horizon. The calcium carbonate equivalent in the B3ca and C1ca horizons ranges from about 20 to 45 percent.

More clay has been moved from the A horizons into the B2t horizons in Parleys soils than in Timpanogos soils. Also Parleys soils have stronger structure in the B horizons. About 12 to 16 percent more clay is in the B2t horizon in Parleys loam than is in the A horizon, and continuous clay films are generally on peds. Soil structure is generally moderate prismatic.

Timpanogos and Parleys soils occur close together, and they have been in place about the same length of time. Differences in the texture of their parent materials have made a significant difference in the degree of profile development.

In the survey area, Parleys soils are the only soils in the Chestnut great soil group that have medial profile development.

BRUNIZEMS

These are zonal soils having a very dark brown or very dark grayish-brown surface horizon that grades to a brown or dark-brown B horizon overlying lighter colored parent material at a depth of 2 to 5 feet. These soils developed under grasses, forbs, scattered shrubs, bushes, and vines.

In the Davis-Weber Area, the Brunizems have a very dark brown or very dark grayish-brown A horizon, a weak to moderate B2 horizon, and an olive-brown, olive, or brown C horizon. These soils developed mainly in alluvium and colluvium that were derived from noncalcareous gneiss, schist, granite, and quartzite, or rocks low in bases.

The climate in areas of these soils is temperate, moist or dry subhumid. The average annual precipitation is about 20 inches, and the average annual temperature is about 51° F. These Brunizem soils receive slightly more annual precipitation than the Chestnut soils. Almost all of the soluble salts has been removed from the profile to

a depth below 60 inches. Some of the bases have been leached from the upper layers and have been replaced by hydrogen. Base saturation is as much as 80 percent. The profile is slightly acid to neutral throughout. The A horizon averages about 9 inches in thickness, and the solum about 24 inches. Organic matter has accumulated in the upper 8 to 12 inches. Some clay has been transported from the A horizon to the B horizon or has formed in place in the B horizon. This clay appears as films on sand grains and on ped faces. The B2 horizon usually contains 3 to 12 percent more clay than the A and is slightly redder in hue, stronger in chroma, and higher in value. The Brunizems in this survey area probably have a thinner solum than a typical Brunizem.

Two stages, or degrees, of profile development occur. In the minimal stage the B2 horizon is weak, and in the medial stage the B2t horizon is moderate. The degree of profile development is based on the distinctness of horizons as expressed by texture, structure, color, reaction, or other characteristics.

Brunizems with minimal development.—This stage is shown by a profile of Kilburn gravelly sandy loam, 6 to 10 percent slopes, 630 feet north and 200 feet west of the west quarter corner of section 25, T. 4 N., R. 1 W.:

A11—0 to 5 inches, very dark grayish-brown (10YR 3/2) gravelly sandy loam, very dark brown (10YR 2/2) when moist; weak, thin, platy structure that breaks easily to weak, fine, granular structure; slightly hard, very friable, slightly sticky and slightly plastic; abundant medium and fine roots; few medium and fine pores; slightly acid (pH 6.5); clear, smooth boundary; horizon 5 to 10 inches thick.

A12—5 to 11 inches, dark-brown (10YR 3/3) gravelly sandy loam, very dark brown (10YR 2/2) when moist; weak, subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; plentiful medium and fine roots; few very fine pores; slightly acid (pH 6/3); gradual, wavy boundary; horizon 4 to 10 inches thick.

B2—11 to 24 inches, light olive-brown (2.5Y 5/4) cobbly sandy loam, olive brown (2.5Y 4/3) when moist; weak, medium, subangular blocky structure; hard, friable, slightly sticky and slightly plastic; plentiful medium and fine roots; few very fine pores; slightly acid (pH 6.1); clear, smooth boundary; horizon 6 to 16 inches thick.

C—24 to 60 inches +, light olive-brown (2.5Y 5/4) very gravelly loamy coarse sand, olive brown (2.5Y 4/3) when moist; weakly massive (structureless) but breaks to single grain; soft, very friable; nonsticky and nonplastic; few fine roots; slightly acid (pH 6.6).

Gravelly sandy loam, cobbly sandy loam, sandy loam, and stony sandy loam were the soil types mapped in this area. The A1 horizon ranges from very dark brown to very dark grayish brown in color. The content of organic matter ranges from about 1.5 to 4 percent. The B2 horizons have weak to moderate, medium, subangular blocky structure. A few thin clay films are on the surface of the aggregates or occur as bridges connecting the sand grains. The pH value ranges from 6.0 to about 6.7, and base saturation is dominantly less than 80 percent. The content of pebbles and cobbles in the A and B horizons ranges from 20 to 50 percent by volume, and that in the C horizon ranges from about 40 to 80 percent. Organic matter has accumulated mainly in the upper 8 to 12 inches. Generally, the B2 horizon has a redder hue, higher value, and a brighter chroma than the A horizon. This indicates a slight increase in the amount of free iron oxides and in the formation of clay. The clay films and coatings on sand grains indicate slight downward movement of clay. The B2 horizon generally shows only 2 to 3 percent more clay than the A horizon. Structure in the B2 horizon is mainly weak to moderate and subangular blocky. The reaction is constant.

The Timpanogos, noncalcareous variant, is another soil in the Brunizem great soil group in this survey area that has minimal development of the profile. This soil developed in nongravelly, medium-textured alluvium that was derived from gneiss, schist, granite, and quartzite. It formed in more recent deposits than the Kilburn soils. It occurs on the lower part of the fans near the Chestnut soils. Organic matter has accumulated mainly in the upper 7 to 8 inches. Base saturation in this soil is generally 80 to 90 percent, and the reaction is neutral to slightly acid. The B2t horizons have a higher value and a stronger chroma than the A horizons, and have about 4 to 6 percent more clay. The B2t horizons have moderate subangular blocky structure and thin continuous or common clay films on ped surfaces.

For a detailed description of a profile of Timpanogos, noncalcareous variant, refer to "Descriptions of Soil Series and Profiles" in this survey.

Brunizem soils with medial development.—This stage of development is shown by a profile of Ridd stony sandy loam in the mapping unit of Ridd rocky sandy loam, 30 to 70 percent slopes, eroded, 250 feet south of the west quarter corner of section 32, T. 3 N., R. 1 E.:

A11—0 to 5 inches, dark grayish-brown (10YR 4/2) stony sandy loam, very dark grayish brown (10YR 3/2) when moist; moderate, thick, platy structure that breaks to weak, fine, granular structure; slightly hard, friable, slightly sticky and slightly plastic; plentiful fine roots; plentiful vesicular pores; common mica flakes; neutral (pH 6.7); clear, wavy boundary; horizon 4 to 8 inches thick.

A12—5 to 9 inches, dark grayish-brown (10YR 4/2) stony sandy loam, very dark grayish brown (10YR 3/2) when moist; weak, fine, subangular blocky structure that breaks to moderate, medium and fine, granular structure; hard, friable, sticky and plastic; plentiful fine roots; common mica flakes; neutral (pH 7.3); clear, wavy boundary; horizon 3 to 7 inches thick.

B2t—9 to 18 inches, brown (10YR 5/3) cobbly heavy sandy loam, dark brown (10YR 4/3) when moist; moderate, medium and fine, subangular blocky structure; hard, firm, sticky and plastic; plentiful fine roots; common fine pores; common thin clay films on peds and in pores; abundant mica flakes; neutral (pH 7.0); gradual, wavy boundary; horizon 7 to 15 inches thick.

B3—18 to 26 inches, light olive-brown (2.5Y 5/4) gravelly sandy loam, olive brown (2.5Y 4/4) when moist; moderate, medium, subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few fine roots; few medium pores; common thin clay films on vertical ped surfaces; abundant mica flakes; neutral (pH 6.6); gradual boundary; horizon 6 to 10 inches thick.

C—26 to 36 inches +, light olive-brown (2.5Y 5/4) very gravelly sandy loam, olive (5Y 4/3) when moist; massive; slightly hard, friable, slightly sticky and slightly plastic; neutral (pH 7.0).

Stony sandy loam and rocky sandy loam soil types were mapped in the survey area. Stones 10 to 48 inches in diameter cover from 10 to 60 percent of the surface in places. When moist, the A1 horizon ranges from very dark grayish brown to dark brown. The content of organic matter in this horizon ranges from 1 to 6 percent.

Coarse fragments make up about 30 to 50 percent of the A1 and B2t horizons, by volume, and from 50 to 90 percent of the C horizon. Depth to underlying bedrock ranges from 25 to 40 inches. The pH ranges from about 6.6 to 7.3 and changes little with depth.

Base saturation of Ridd soils is about 70 to 80 percent, and base-exchange data indicate that bases are being removed from the surface layer. A textural B2t horizon has formed, and the structure of this horizon is moderate. The surface of the aggregates has common, thin to continuous clay films or coatings. The B2t horizon contains about 8 to 12 percent more clay than the A horizon. These soils lack an increase of exchangeable sodium and potassium in the C horizon above bedrock, and generally have less than 0.5 millimho of electrical conductivity throughout the profile.

Ridd soils occur mainly above the highest water level of ancient Lake Bonneville. They have been subjected to weathering longer than Kilburn soils, but time has been somewhat counterbalanced by erosion on the steep slopes. The Ridd soils differ from the Kilburn soils mainly in the amount of clay that has been moved from the A horizon to the B2 horizon. The Ridd soils are the only Brunizems in the survey area that have a profile of medial development.

Intrazonal order

In the Davis-Weber Area, the great soil groups in the intrazonal order are Solonchak, Solonetz, Calcisols (*9*), and Humic Gley. These groups, and a profile representative of each group, are described in the following paragraphs. Some of the soils, however, have characteristics of two great soil groups.

SOLONCHAK SOILS

These intrazonal soils are mostly light colored, have a high concentration of soluble salts, and are without characteristic structural form. They are poorly drained or very poorly drained and have a water table at or near the surface most of the time.

Solonchak soils formed by the process of salinization. Neither the surface water nor the ground water drains away satisfactorily, and salts accumulate when the water evaporates. The highest concentration of salts is generally at or near the surface. Because of these salts, vegetation is sparse and in most places consists of scattered clumps of salt-tolerant plants.

The surface layer is light colored and has a low content of organic matter. The Solonchak soils in the Davis-Weber Area occur on the nearly level lake plain adjacent to Great Salt Lake or in the depressions on low lake terraces.

A representative profile of Saltair silty clay loam, near the center of the southwest quarter of section 3, T. 1 N., R. 1 W.:

A1sa—0 to 1 inch, gray (5Y 6/1) silt loam, dark grayish brown (2.5Y 4/2) when moist; weak, thick, platy structure; slightly hard, friable, slightly sticky and slightly plastic; moderately calcareous; very strongly alkaline (pH 9.4); abrupt, smooth boundary; horizon 1 to 3 inches thick.

C1sa—1 to 4 inches, light-gray (2.5Y 7/2) silty clay loam, light brownish gray (2.5Y 6/2) when moist; weak, thick, platy structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and medium pores; moderately calcareous; very strongly alkaline (pH 9.2); clear, smooth boundary; horizon 2 to 20 inches thick.

C2sa—4 to 9 inches, light-gray (5Y 7/2) silty clay loam, light olive gray (5Y 6/2) when moist; massive; hard, firm, sticky and plastic; common fine and medium pores; few, medium, distinct mottles of brown; moderately calcareous; very strongly alkaline (pH 9.2); clear, wavy boundary; horizon 0 to 10 inches thick.

C3sa—9 to 20 inches, white (5Y 8/2) silty clay loam, light olive gray (5Y 6/2) when moist; massive; hard, firm, sticky and plastic; common fine and medium pores; common, fine, distinct mottles of brown; moderately calcareous; strongly alkaline (pH 9.0); gradual, wavy boundary; horizon 8 to 16 inches thick.

C4sa—20 to 32 inches, light-gray (5Y 7/2) silt loam, light olive gray (5Y 6/2) when moist; massive; hard, firm, sticky and plastic; common fine and medium pores; few, fine, distinct mottles of brown; moderately calcareous; strongly alkaline (pH 8.8); abrupt, smooth boundary; horizon 0 to 15 inches thick.

IIC5sa—32 to 44 inches, pinkish-gray (7.5YR 7/2) silty clay loam, pinkish gray (7.5YR 6/2) when moist; massive; hard, firm, sticky and very plastic; common medium and fine pores; moderately calcareous; strongly alkaline (pH 8.8); abrupt, smooth boundary; horizon 0 to 14 inches thick.

IIC6sa—44 to 60 inches, light-gray (2.5Y 7/2) silty clay loam, light brownish gray (2.5Y 6/2) when moist; massive; hard, firm, very sticky and very plastic; common medium and fine pores; many, coarse, prominent mottles of reddish yellow; moderately calcareous; strongly alkaline (pH 8.8).

The surface layer is dominantly silty clay loam in texture. When moist, the A1 horizon ranges from olive gray to grayish brown in hues of 2.5Y and 5Y. The C horizons are stratified, but they generally have moderately fine texture to a depth of 40 inches. These horizons range from olive gray to white, reddish brown, or bluish gray in color. In most places the surface is crusted with salts.

In most places water covers these soils at times. Little profile development is shown. In places capillary water has evaporated, and salts crust the surface. Typically, these soils contain more than 2 percent soluble salts, mainly of sodium chloride, throughout their profile. They are usually barren, but in places pickleweed, samphire, and saltgrass grow in scattered areas. The saltgrass grows where fresh water has flooded the soils and has leached out some of the salts or removed them from the surface. In these areas, an A1 horizon 1 to 2 inches thick has developed.

In the Davis-Weber Area other soils of the Solonchak great soil group that are somewhat similar to the Saltair soils are in the Lakeshore, Wayment, and Refuge series. The Saltair soils, however, are most extensive.

The Lakeshore soils are similar to the Saltair soils, but they are coarser textured throughout the profile and in places have a slightly thicker A1 horizon.

The Wayment and Refuge soils both formed in mixed calcareous alluvium on nearly level low flood plains. Wayment soils are somewhat similar to Saltair soils but have a very dark grayish-brown or dark grayish-brown silty clay loam A1 horizon 3 to 12 inches thick. Also, the C horizon of Wayment soils is brown, dark-brown, or dark grayish-brown silty clay loam, heavy silt loam, or loam. Organic matter has accumulated in the upper 6 to 8 inches of the surface layer. These soils contain more than 2 percent soluble salts throughout their profile, but the most salts are generally in the A1 horizon or in the upper part of the C horizon.

Refuge soils have an A1 horizon of very dark grayish-brown or dark-brown loam, fine sandy loam, or silt loam that ranges in thickness from about 6 to 21 inches. Organic matter has accumulated in the upper 8 to 10 inches of the surface layer. The C horizons consist of brown stratified fine sand, fine sandy loam, and light loam. The most salt occurs generally between a depth of 20 and 40 inches.

For a detailed description of a profile of Lakeshore, Wayment, and Refuge soils, refer to "Descriptions of Soil Series and Profiles" in the back of this survey.

Eight of the soil series in this area that have been classified as Solonchaks have a higher content of calcium carbonate but a lower content of the more soluble salts than the other Solonchaks. These soil series are the Cudahy, Ford, Gooch, Ironton, Logan, Roshe Springs, Syracuse, and Warm Springs. The Warm Springs soils are representative of this group of Solonchaks.

The Warm Springs are Solonchak soils that have a strong horizon of accumulated calcium carbonate. These soils are extensive in the survey area. They occur on broad, low lake terraces and developed in areas that have a fluctuating high water table. Warm Springs soils are somewhat poorly drained and are affected by salts and alkali. They have a calcareous, very dark grayish-brown, friable A1 horizon 6 to 12 inches thick. This horizon ranges in pH values from 7.5 to 9.6 or more. A strong horizon of carbonate accumulation is within a depth of 16 inches. The Cca horizons are light colored and strongly calcareous. They range in pH values from about 8.6 to 9.6 or more.

A profile of Warm Springs fine sandy loam, 0 to 1 percent slopes, 640 feet west of the southwest corner of section 17, T. 4 N., R. 2 W.:

A1—0 to 8 inches, grayish-brown (10YR 5/2, dry) fine sandy loam, very dark grayish brown (10YR 3/2), moist); weak, medium, platy structure; slightly hard, friable, nonsticky and nonplastic; abundant fine and medium roots; few fine pores; moderately calcareous; mildly alkaline (pH 7.5); abrupt, smooth boundary; horizon 6 to 12 inches thick.

C1ca—8 to 15 inches, light brownish-gray (10YR 6/2) heavy fine sandy loam, dark grayish brown (10YR 4/2) when moist; massive; slightly hard, friable, nonsticky and nonplastic; plentiful fine and medium roots; few fine pores; strongly calcareous; very strongly alkaline (pH 9.4); clear, smooth boundary; horizon 5 to 10 inches thick.

C2ca—15 to 24 inches, light-gray (10YR 7/2) heavy fine sandy loam, grayish brown (2.5Y 5/2) when moist; massive; soft, very friable, nonsticky and nonplastic; few fine roots; few fine pores; strongly calcareous; very strongly alkaline (pH 9.5); clear, smooth boundary; horizon 6 to 12 inches thick.

C3ca—24 to 37 inches, light-gray (2.5Y 7/2) heavy fine sandy loam, light brownish gray (2.5Y 6/2) when moist; massive; slightly hard, very friable, nonsticky and nonplastic; few fine roots; few fine pores; strongly calcareous; very strongly alkaline (pH 9.6); abrupt, smooth boundary; horizon 6 to 18 inches thick.

C4—37 to 60 inches, light-gray (2.5Y 7/2) loamy fine sand, light brownish gray (2.5Y 6/2) when moist; massive; hard, very friable, nonsticky and nonplastic; few fine pores; strongly calcareous; very strongly alkaline (pH 9.9).

Fine sandy loam is the only soil type of the Warm Springs series mapped in the survey area. When moist, the A1 horizon ranges from very dark grayish brown to dark grayish brown or dark brown in hues of 10YR and 2.5Y. The content of organic matter in this horizon ranges from 1 to 2.5 percent. The control section is mainly heavy fine sandy loam, but it ranges to light loam or light silt loam. When moist, the Cca horizons range from dark grayish brown to light gray in color. The calcium carbonate equivalent of these horizons ranges from 15 to 30 percent. Depth to the water table in most places is 20 to 40 inches. The parent materials are high in alkaline earth carbonates, and the formation and movement of clay has been inhibited or retarded. The only horizon differentiation is carbonate enrichment. The horizon of carbonate accumulation generally occurs at a depth of 12 to 16 inches. These soils are calcareous from the surface downward, and the content of soluble salts is highly variable.

As mentioned earlier other Solonchak soils that have a horizon of strong carbonate accumulation are in the Cudahy, Ford, Gooch, Ironton, Logan, Roshe Springs, and Syracuse series. These soils range from somewhat poor to very poor in drainage. They occur on low lake plains or flood plains and formed in areas that have a high or intermittently high water table. They have a very dark grayish-brown to black, calcareous A1 horizon that overlies a calcareous, grayish-brown or nearly white Cca horizon. The C horizons are calcareous and are gleyed in places.

Ford soils have a calcareous, very dark grayish-brown, friable A horizon that ranges from about 5 to 12 inches in thickness. The pH values range from about 8.6 to 10.0 or more. The A1 horizon overlies a calcareous, lighter colored Cca horizon that is cemented into a hardpan. The Ford soils are medium textured, are somewhat poorly drained to poorly drained, and are affected by salts and alkali. They occur on smooth nearly level low lake terraces near the breaks from higher terraces. Except for the lime-cemented hardpan, Ford soils have little horizon differentiation. The pans range from strongly cemented to indurated, and from 3 to 24 inches in thickness. Several thin pan layers, separated by lenses of fine sandy loam, occur in a single profile in many places. Depth to the hardpan ranges from 20 to 40 inches. The water table fluctuates seasonally, and the soils are saturated with water for long periods each year unless artificially drained. Depth to the water table ranges from 10 to 60 inches, but in most places it ranges from 30 to 36 inches. The hardpans are very slowly permeable.

Syracuse soils are similar to Warm Springs soils but are coarse textured. Typically, they are loamy fine sand throughout their profile, and the horizon of carbonate accumulation is lower in their profile than in Warm Springs soils.

Ironton soils are similar to Warm Springs soils, but have a thicker, darker colored A1 horizon. Ironton soils have a calcareous, very dark gray, friable silt loam A1 horizon 16 to 22 inches thick. These horizons are 3 to 10 percent organic matter. The pH values range from 8.0 to 8.6. Texture of the control section is dominantly silt loam or light silty clay loam. Calcium carbonate equivalent of the Cca horizon ranges from 30 to 50 percent.

Gooch soils occur in depressions on low lake terraces and are poorly drained and somewhat poorly drained. These soils are similar to Warm Springs soils but have a dark-gray or gray silt loam A1 horizon. They have been more affected by a high water table and by salts

and alkali than the Warm Springs soils. Poor drainage is indicated by mottles and by gleying. Gleying occurs when the oxygen needed for oxidation is excluded by a high water table. Then, reduction of iron compounds in the soil occurs. These compounds lose oxygen, and the soil becomes gray or green.

Logan, Roshe Springs, and Cudahy soils have a black or very dark gray A horizon that contains much organic matter. Because of gleying, these soils have been placed at times, in the Humic Gley great soil group. In places, a peaty layer, as much as 5 inches thick, occurs on the surface, but the content of organic matter in the A horizon ranges mainly from 4 to 20 percent. All these soils are poorly drained, and undrained areas have a water table that is dominantly at a depth of less than 20 inches. The only horizon of development is the accumulation of organic matter, accumulation of carbonates, and gleying. The Logan soils are moderately fine textured, and the Roshe Springs and Cudahy soils are medium textured. Roshe Springs soils are very strongly calcareous. They have more than 40 percent carbonate equivalent throughout the profile and about 70 percent carbonates in the Cca horizons. Like the Ford soils, the Cudahy have a lime-cemented hardpan at a depth of 20 to 40 inches.

For a detailed description of a profile of Cudahy, Ford, Gooch, Ironton, Logan, Roshe Springs, and Syracuse soils, refer to "Descriptions of Soil Series and Profiles" at the back of this survey.

SOLONETZ SOILS

These intrazonal soils are strongly affected by salts and alkali. They developed in a dry subhumid climate. These soils have a friable A1 or A2 horizon of variable thickness and a moderate to strong B2t horizon that has prismatic or columnar structure. They are generally calcareous and are high in exchangeable sodium. The C horizon is generally strongly calcareous and lighter colored than the B2t horizon.

The Solonetz soils in the Davis-Weber Area probably developed from Solonchak soils. They occur on low lake terraces, in most places a few feet higher than the Solonchak soils. Where drainage has improved because the lake water has receded, percolating rainwater has gradually carried part of the soluble salts downward. This removal of salts made the soils more favorable for plant growth.

Because of the high percentage of sodium in the soil solution, sodium became the dominant exchangeable ion of the clay particles. Some of the clay, primarily that in suspension, was moved from the A1 to the B2t horizon. Sodium clays swell and disperse when they are wet, and pore space, permeability, and aeration are greatly reduced. On drying, the soil mass contracts and cracks. Where alternate wetting and drying is continuous, distinct cleavage planes are formed, and a typical prismatic or columnar B2t horizon is developed.

In the Davis-Weber Area, soils of eight series are classified in the Solonetz great soil group. All these soils developed in mixed lake sediments under restricted drainage. Depth to the water table generally ranges from 10 to 40 inches. The degree of development of distinct horizons is variable. These soils are grouped to show two stages of profile development; those that have medial development are the Arave, Airport, Harrisville, Terminal, and Croy; those that have maximal development are the Leland, Payson, and Trenton soils.

Solonetz soils with medial development.—This stage of development is shown by a profile of Arave silt loam, 1.5 miles north and 0.5 mile west of Hooper School in the northeast quarter of section 12, T. 5 N., R. 3 W.:

A1—0 to 8 inches, light brownish-gray (2.5Y 6/2) silt loam, dark grayish brown (2.5Y 4/2) when moist; weak, medium, platy structure; soft, friable, nonsticky and nonplastic; abundant medium roots; common medium pores; slightly calcareous; strongly alkaline (pH 8.6); clear, smooth boundary; horizon 6 to 10 inches thick.

B1ca—8 to 12 inches, light gray (10YR 7/2) heavy loam, grayish brown (2.5Y 5/2) when moist; weak, medium, subangular blocky structure; hard, very friable, slightly sticky and slightly plastic; plentiful medium roots; common medium pores; strongly calcareous; strongly alkaline (pH 8.7); clear, smooth boundary; horizon 3 to 5 inches thick.

B2tca—12 to 18 inches, white (2.5Y 8/2) clay loam, light olive brown (2.5Y 5/4) when moist; moderate, medium, prismatic structure; very hard, firm, slightly sticky and plastic; few medium roots; common medium pores; thin continuous clay films; strongly calcareous; strongly alkaline (pH 8.9); clear, smooth boundary; horizon 5 to 9 inches thick.

C1—18 to 36 inches, light gray (5Y 7/2) silty clay loam, light olive brown (2.5Y 5/4) when moist; massive; very hard, firm, slightly sticky and slightly plastic; few fine and medium roots; common fine pores; common, fine, distinct mottles of yellowish brown (10YR 5/6); strongly calcareous; very strongly alkaline (pH 9.1); clear, wavy boundary; horizon 9 to 21 inches thick.

C2—36 to 42 inches, pale-yellow (2.5Y 7/4) silt loam, light olive brown (2.5Y 5/4) when moist; massive; slighty hard, firm, nonsticky and slightly plastic; few fine roots; common fine pores; common, coarse, prominent mottles of yellowish brown (10YR 5/8); strongly calcareous; strongly alkaline (pH 8.9); clear, wavy boundary; horizon 8 to 16 inches thick.

C3—42 to 60 inches, pale-yellow (2.5Y 7/4) light silty clay loam, light olive brown (2.5Y 5/4) when moist; massive; hard, firm, slightly sticky and slightly plastic; few fine roots; common fine pores; common, coarse, prominent mottles of yellowish brown (10YR 5/8); strongly calcareous; strongly alkaline (pH 8.8).

In the Davis-Weber Area, Arave soil is mapped only in a complex with Saltair soils. When moist, the A1 horizon ranges from dark grayish brown or dark gray to grayish brown or gray. The content of organic matter ranges from 0.6 to 2.5 percent. The A1 horizon is slightly to moderately calcareous. The B2t horizon has weak or moderate prismatic structure, and thin continuous clay films are on ped surfaces. Texture is clay loam in most places, but it ranges to silty clay loam. When moist, the B2t horizon ranges from gray to light olive brown in hues of 10YR and 2.5Y. This horizon is mainly strongly alkaline to very strongly alkaline. Exchangeable sodium percentage generally increases with depth. Depth to the water table ranges from 12 to 40 inches. Distinct mottles occur at a depth of 15 to 25 inches and become more prominent as depth increases. Most of the soluble salts and carbonates have been removed from the thin surface horizon. The electrical conductivity of the A horizon is about 5 to 8 millimhos, and the calcium carbonate equivalent to a depth of 6 to 8 inches is only about 3 to 5 percent. The surface layer has some accumulation of organic matter. Carbonates have accumulated in the B2t horizon, and it is strongly calcareous. This horizon

contains 10 to 20 percent more clay than the A horizon. There is some color differentiation and slight evidence of gleying, or reduction of iron, similar to that of soils in the Humic Gley great soil group.

Airport soils are slightly better drained than Arave soils and have a thicker A horizon that is very dark gray or very dark grayish brown. These soils contain 3 to 5 percent organic matter to depths of 15 to 20 inches. They have a distinct zone of carbonate accumulation at a depth of 12 to 20 inches.

The A and B2t horizons are strongly calcareous; they contain about 30 percent carbonates. The B3ca horizon is very strongly calcareous. The B2t horizon has moderate to strong prismatic structure. Common to continuous clay films are on the peds. The B2t horizon has about 10 to 15 percent more clay than the A horizon. Depth to the water table ranges mainly from 20 to 60 inches.

Terminal soils are similar to Arave soils, but have a strongly cemented or indurated lime hardpan at a depth of 12 to 40 inches. This hardpan probably formed when the ground water, rich in lime, remained constant long enough for the carbonates to precipitate at the surface of the water table or by the capillary rise of moisture. Then, as the water table fell, the carbonates hardened as they were dehydrated.

Harrisville soils appear to have developed originally as normal soils of the Chestnut great soil group. Recently, however, their B2t horizon has been saturated with sodium by the upward moving ground water. The highest concentration of exchangeable sodium is in the lower part of the B horizon and the upper part of the C horizon. Depth to the water table now is about 30 to 48 inches.

Harrisville soils have very dark grayish-brown, thin A horizons that contain 2 to 4 percent organic matter in the upper 6 to 9 inches. Soluble salts and carbonates have been leached downward, and nearly all the more soluble salts have been removed from the profile. The carbonates have accumulated in the B2t horizon. The B2t horizon was formed by the translocation of the clay from the A horizon to the B horizon, or by the formation of clay in place from parent material. In most places the B2t horizon has a redder hue, a higher value, and a brighter chroma than the A1 horizon, and it contains about 8 to 10 percent more clay.

Croy soils are similar to Arave soils, but they have an indurated pan that formed by the translocation of lime and silica as a result of leaching and of fluctuating ground water high in sodium. The hardpan is insoluble in either strong acid or alkali. It has variable thickness, ranging from 3 to 40 inches, and occurs at an average depth of about 55 inches. Now, the water table in most places is lower than that in the Arave soils. The B2t horizon of the Croy soils has weak or moderate prismatic structure and has thin clay films on the peds. This horizon is not so distinct nor so strongly expressed as the B2t horizon in the Leland and Payson soils.

For a detailed description of a profile of Airport, Terminal, Harrisville, and Croy soils, refer to "Descriptions of Soil Series and Profiles" at the back of this survey.

Leland soils appear to have maximal development. They have a light-colored, ashy silt loam A2 horizon 4 to 8 inches thick. The B2t horizon is brown in the hue of 7.5YR and has strong columnar structure. The surface of the columns are generally noncalcareous, but the interior is moderately and strongly calcareous. Thick continuous clay films are on ped surfaces. The B2t horizon contains a high concentration of exchangeable sodium, and their pH ranges from 9.3 to 10.0 or more.

Solonetz soils with maximal development.—This stage is shown by a profile of Leland silt loam, about 1,400 feet west of the east-central part of section 21, T. 6 N., R. 2 W.:

A2—0 to 8 inches, light brownish-gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) when moist; moderate, medium, platy structure; slightly hard, friable, slightly sticky and slightly plastic; abundant fine roots throughout and a distinct mat of roots between the A2 horizon and the top of the B2t horizon; common, fine and medium, vesicular pores; noncalcareous; moderately alkaline (pH 8.3); abrupt, smooth boundary; horizon 4 to 8 inches thick.

B2tca—8 to 14 inches, light-brown (7.5YR 6/4) clay loam, brown (7.5YR 5/4) when moist; strong, medium, columnar structure that breaks to strong, medium, subangular blocky structure; columns have faint grayish caps on top; very hard, very firm, sticky and very plastic; few fine roots in cleavage planes; common medium pores; moderately thick continuous clay films on vertical and horizontal ped surfaces; surface of peds noncalcareous to slightly calcareous, interior strongly calcareous; very strongly alkaline (pH 9.3); clear, wavy boundary; horizon 3 to 8 inches thick.

B3ca—14 to 19 inches, light-brown (7.5YR 6/4) fine sandy clay loam, brown (7.5YR 5/4) when moist; moderate, medium, subangular blocky structure; very hard, firm, slightly sticky and plastic; few fine roots; common fine pores; strongly calcareous; very strongly alkaline (pH 9.7); clear, smooth boundary; horizon 4 to 12 inches thick.

C1—19 to 31 inches, pale-brown (10YR 6/3) very fine sandy clay loam with many layers of very fine sandy loam and thin lenses of clay loam, brown (10YR 5/3) when moist; massive; hard, friable, sticky and slightly plastic; few fine roots; very few fine pores; moderately calcareous; very strongly alkaline (pH 10.1); clear, smooth boundary; horizon 10 to 13 inches thick.

C2—31 to 38 inches, pink (7.5YR 7/4) silt loam with many layers of brown (10YR 5/3) very fine sandy loam and lenses of brown (10YR 5/4) thin clay loam, brown (7.5YR 5/4) when moist; few fine, distinct mottles of yellowish brown (10YR 5/6); massive; hard, friable, slightly sticky and slightly plastic; few fine pores; moderately calcareous; very strongly alkaline (pH 9.8); clear, smooth boundary; horizon 7 to 18 inches thick.

C3—38 to 58 inches +, pale-brown (10YR 6/3, dry) very fine sandy loam, brown (10YR 5/3, moist); massive; slightly hard, very friable, nonsticky and nonplastic; few fine pores; few, fine, faint mottles of yellowish brown (10YR 5/6); moderately calcareous; very strongly alkaline (pH 9.8).

The A2 horizon ranges from silt loam to silty clay loam in texture. When moist, this horizon ranges from dark grayish brown to brown in color. Structure of the A2 horizon ranges from weak, thin, platy to moderate, thick, platy. The B2t horizon is clay loam in most places but ranges to light clay. The C horizons are stratified lake-laid sediments ranging from clay loam to very fine sandy loam or loamy fine sand in texture. The water table commonly is at a depth of 48 to 60 inches. Distinct mottles occur at a depth ranging from 23 to 31 inches. The light-colored, ashy A2 horizon is the result of extensive bleaching and leaching. Most of the soluble salts and carbonates have been removed from the upper 6 to

8 inches. The electrical conductivity generally is about 2 to 4 millimhos near the surface and increases fairly gradually to about 20 to 25 millimhos in the C horizon. The carbonate equivalent increases rather abruptly in the strongly calcareous B2tca and B3ca horizons at a depth of 8 to 12 inches. Only a small amount of organic matter, generally less than 1 percent, has accumulated in the surface horizon. The B2t horizon has a redder hue and a brighter chroma than the A2 horizon. This redder, brighter color indicates an increase in free iron oxide and the formation or accumulation of clay. The B2t horizon contains 20 to 30 percent more clay than the A horizon.

Payson soils are similar to Leland soils but appear to be somewhat reclaimed or solodized. They occur at about the same elevation as the Leland soils and receive about the same amount of precipitation, but leaching appears to have been more effective. The upper part of the B2t horizon is leached of lime, and the highest concentration of exchangeable sodium is in the lower part of the B3ca horizon. The parent material of the Payson soils is mainly fine-textured lake sediments that have hues of 2.5Y and 10YR. The B2t horizon has strong columnar structure, and the peds have thick continuous clay films. In the B3ca horizon, the clay films on peds are usually thin and patchy. When moist, the B horizon ranges from very dark grayish brown to gray or light brownish gray in hues of 2.5Y and 10YR. Depth to the water table is commonly 40 to 60 inches.

Trenton soils occur on the slightly higher lake terraces or remnants of terraces. Like Harrisville soils, they appear to have developed originally more nearly as a normal zonal soil and recently have become saturated in the B2t horizon by ground water containing much sodium. The highest concentration of exchangeable sodium is in the lower B horizon or upper part of the C horizon. Accumulated organic matter in the surface horizon gives it a very dark brown or very dark grayish-brown color to a depth of 10 to 15 inches. The A horizon and upper B2t horizon are mildly to moderately alkaline.

For a detailed description of a profile of Payson and Trenton soils, refer to "Descriptions of Soil Series and Profiles" at the back of this survey.

CALCISOLS

These intrazonal soils formed in parent materials that contained large amounts of alkaline earth carbonates. The only distinct horizon development is the accumulation of carbonates in C horizons (*9*). Not enough clay has been formed or moved downward for the formation of a B2 horizon. These soils are well drained. In most places they have a calcareous surface horizon but lack a B2 horizon above the Cca.

The Hillfield and Sterling soils have minimal profile development. Hillfield soils have a weak, calcareous, dark-brown A1 horizon 1 to 6 inches thick. The A1 horizon overlies Cca horizons that contain about 5 to 10 percent more calcium carbonate equivalent than either the A1 horizon or the underlying C horizon.

These soils occur mainly on the west and southwest faces of strongly sloping to very steep terrace escarpments. Erosion of the surface layer has removed enough soil material to keep these soils relatively young. Because surface runoff is rapid and only a small part of the total precipitation enters the soil, soil formation is retarded.

Calcisols with minimal development.—This stage of development is shown by a profile of Hillfield silt loam, 20 to 30 percent slopes, eroded, 850 feet north and 500 feet east of the south quarter corner of section 14, T. 4 N., R. 1 W.:

Ap—0 to 6 inches, brown (10YR 5/3) light silt loam, dark brown (10YR 4/3) when moist; moderate, medium and fine, granular structure; slightly hard, very friable, slightly sticky and slightly plastic; plentiful medium and fine roots; many medium pores; strongly calcareous; mildly alkaline (pH 7.8); gradual, wavy boundary; horizon 2 to 8 inches thick.

C1ca—6 to 12 inches, pale-brown (10YR 6/3) silt loam, dark brown (10YR 4/3) when moist; weak, medium and fine, subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; plentiful medium and fine roots; many medium pores; strongly calcareous; mildly alkaline (pH 7.8); gradual, wavy boundary; horizon 6 to 25 inches thick.

C2—12 to 21 inches, pale-brown (10YR 6/3) silt loam, dark brown (10YR 4/3) when moist; weak, medium, subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; few fine pores; strongly calcareous; moderately alkaline (pH 7.9); gradual, wavy boundary; horizon 6 to 18 inches thick.

C3—21 to 60 inches +, pale-brown (10YR 6/3) stratified very fine sandy loam and clay loam, brown (10YR 5/3) when moist; moderate, thick, platy structure; slightly hard, friable, sticky and plastic; few pores; common, distinct, medium mottles of brown (10YR 5/3; strongly calcareous; moderately alkaline (pH 8.1).

The surface layer ranges from silt loam to fine sandy loam in texture. In places, layers of lake terrace materials extend to within a few inches of the surface. The A1 horizon ranges from dark brown to brown or grayish brown in color. The content of organic matter in this horizon ranges from about 1 to 3 percent. Texture of the control section is dominantly silt loam or silty clay loam. The C horizon is often stratified and ranges from fine sand to clay loam in texture.

Some lime from the surface layer, or A1 horizon, is gradually being moved to somewhat lower depths. The A1 horizon remains calcareous either because the content of lime is unusually high or because sheet erosion removes soil about as fast as it is formed. Except for the prominent accumulation of lime in the Cca horizon, the Hillfield soils show little horizon development. These soils are generally mildly to moderately alkaline and are relatively low in soluble salts.

The Sterling soils are similar to Hillfield soils but are very gravelly, very cobbly, or rocky. In addition, they have a very dark brown A1 horizon that contains a moderate amount of organic matter.

For a detailed description of a profile of Sterling soils, refer to "Descriptions of Soil Series and Profiles" at the back of this survey.

HUMIC GLEY SOILS

Humic Gley soils are intrazonal. They are poorly drained and very poorly drained soils that have a moderately thick, dark, organic-mineral horizon underlain by mineral gleyed horizons. These soils developed naturally under swamp or marsh vegetation in a subhumid climate.

In the Davis-Weber Area, the Woods Cross soils are the most extensive of this group. They have a friable, dark A1 horizon that is 4 to 10 percent organic matter. This horizon is 24 to 40 inches thick. Generally, gleying occurs in the presence of organic matter or its soluble products when the soil is saturated.

When water saturates the soil almost to the surface, oxygen becomes deficient and the small amount of oxygen in the soil is used up by bacteria. In the absence of oxygen, reduction of the highly colored (reddish) ferric iron compounds occurs, and the gray colors result. The color of the soil then changes to the grayish or greenish color of the ferrous iron compounds. Reduction is most extensive just below the surface, where the bacteria are most numerous.

A representative profile of Woods Cross silty clay loam, drained, 1,000 feet south and 300 feet east of the north quarter corner of section 25, T. 2 N., R. 1 W.:

Ap—0 to 6 inches, dark-gray (10YR 4/1) light silty clay loam, black (10YR 2/1) when moist; weak, medium and fine, granular structure; slightly hard, friable, slightly sticky and plastic; abundant medium and fine roots; many medium and fine pores; very slightly calcareous; mildly alkaline (pH 7.6); abrupt, smooth boundary; horizon 5 to 10 inches thick.

A12—6 to 37 inches, dark-gray (10YR 4/1) heavy silty clay loam, black (10YR 2/1) when moist; few, distinct mottles of yellowish brown (10YR 5/6); weak, medium, subangular blocky structure; very hard, firm, sticky and plastic; abundant medium and fine roots; many medium and fine pores; very slightly calcareous; mildly alkaline (pH 7.6); abrupt, smooth boundary; horizon 15 to 40 inches thick.

Cg—37 to 72 inches, light-gray (5Y 7/1) silty clay, gray (5Y 5/1) when moist; common, distinct mottles of yellowish brown (10YR 5/6); weak, medium and fine, subangular blocky structure; very hard, firm, very sticky and very plastic; few fine roots; few fine pores; noncalcareous; mildly alkaline (pH 7.7).

When moist, the A1 horizons range from black to very dark gray in color. The content of organic matter ranges from 4 to 10 percent. Distinct mottles occur in or immediately below the A1 horizons and throughout the C horizon. In undrained areas, the water table is at or near the surface most of the time. Gleying generally begins immediately below the A1 horizon.

Woods Cross soils developed in moderately fine textured noncalcareous alluvium. In places, these soils are slightly calcareous because they have been flooded with water containing much carbonates. The content of soluble salts is generally low throughout the profile. These soils are mainly neutral.

Also in the Humic Gley great soil group in the Davis-Weber Area are the Chance soils. Chance soils have thinner A1 horizons than the Woods Cross soils and are medium textured. Also, gleying is less pronounced in the Chance soils.

For a detailed description of a profile of Chance soils, refer to "Descriptions of Soil Series and Profiles" at the back of this survey.

Azonal order

In the Davis-Weber Area, two great soil groups—Alluvial soils and Regosols—are in the azonal order. These groups and a profile of a soil representative of each group, are described in the following paragraphs.

ALLUVIAL SOILS

These are well-drained to somewhat poorly drained azonal soils that have little or no profile development. They consist of recently deposited alluvium that has been changed very little by the soil-forming processes (*16*). The characteristics of these soils are determined largely by the kind of parent materials and by the manner in which these materials have been sorted and deposited. Except on the flood plain of the Weber River, the vegetation consists of grasses and shrubs, similar to that of the nearby zonal soils. Dominant along the Weber River are cottonwood and boxelder trees together with willows and rose bushes. Ackmen soils are representative of this group.

A representative profile of Ackmen loam, 1 to 3 percent slopes, 0.1 mile north of the west half corner of section 36, T. 5 N., R. 1 W.:

Ap—0 to 6 inches, very dark grayish-brown (10YR 3/2) loam, very dark brown (10YR 2/2) when moist; moderate, medium and fine, granular structure; slightly hard, friable, slightly sticky and slightly plastic; abundant fine roots; neutral (pH 7.3); clear, smooth boundary; horizon 5 to 18 inches thick.

AC—6 to 32 inches, dark-brown (10YR 3/3) loam, very dark brown (10YR 2/2) when moist; weak, medium, prismatic structure that breaks easily to moderate, medium and fine, granular structure; slightly hard, friable, slightly sticky and slightly plastic; abundant fine roots; many fine pores; neutral (pH 7.2); clear, smooth boundary; horizon 0 to 26 inches thick.

C—32 to 60 inches, dark yellowish-brown (10YR 4/4) dry loam, dark brown (10YR 3/3) when moist; massive; hard, friable, slightly sticky and slightly plastic; few fine roots; few fine pores; mildly alkaline (pH 7.4); horizon 20 to 45 inches thick.

The Ackmen soils are well drained. Loam is the only soil type mapped in the survey area. The content of organic matter in the A1 horizon ranges from about 2 to 5 percent. Typically, Ackmen soils are noncalcareous throughout, but in places they are slightly calcareous. They are generally free of coarse fragments, but in some places they have a small amount of gravel and in other places a gravelly substratum.

The Ackmen soils have a minimum horizon development.

Other well-drained soils in the Alluvial great soil group are the Pleasant View, Steed, and Marriott, calcareous variant.

The Pleasant View soils are very dark brown, noncalcareous or slightly calcareous, and medium textured. They developed in mixed alluvium that weathered from gneiss, schist, and granite. These soils have stronger horizon development than Ackmen soils. Their surface layer has been leached of carbonates, and the C horizons below a depth of 25 inches are moderately calcareous.

Steed soils are very dark grayish-brown, calcareous, sandy and gravelly loams that were derived from mixed alluvium on river flood plains. These soils formed in more recently deposited alluvium than the other well-drained soils in this group. Consequently, they have thinner A1 horizons and less organic matter. These soils are calcareous throughout.

Marriott, calcareous variant, are very dark grayish-brown, gravelly and cobbly, moderately coarse textured soils. These soils developed in alluvium and colluvium mainly from limestone. The only horizon development

noticeable in these soils is a slight accumulation of organic matter in the A1 horizon. These soils are strongly calcareous.

For a detailed description of a profile of Pleasant View, Steed and Marriott, calcareous variant, soils, refer to "Descriptions of Soil Series and Profiles" at the back of this survey.

In addition to the four well-drained soils in the Alluvial great soil group, there are four moderately well drained and somewhat poorly drained soils. These soils have somewhat darker A1 horizons than the well-drained soils, a higher content of organic matter, and mottles at a depth of 20 to 40 inches. Draper soils are representative of this group.

A representative profile of Draper loam, 0 to 1 percent slopes, 500 feet north and 150 feet east of the southwest corner of section 18, T. 2 N., R. 1 E.:

Ap—0 to 8 inches, dark-gray (10YR 4/1) loam, black (10YR 2/1) when moist; moderate, medium, granular structure; slightly hard, friable, slightly sticky and slightly plastic; abundant medium and fine roots; many fine pores; noncalcareous; mildly alkaline (pH 7.4); clear, smooth boundary; horizon 0 to 10 inches thick.

A12—8 to 21 inches, dark-gray (10YR 4/1) heavy loam, black (10YR 2/1) when moist; weak, medium, blocky structure; hard, firm, slightly sticky and slightly plastic; abundant medium roots; many fine pores; noncalcareous; mildly alkaline (pH 7.4); clear, smooth boundary; horizon 10 to 20 inches thick.

A13—21 to 30 inches, dark-gray (10YR 4/1) loam, black (10YR 2/1) when moist; weak, medium, prismatic structure that breaks readily to weak, medium, granular structure; slightly hard, friable, slightly sticky and slightly plastic; plentiful medium and fine roots; many fine pores; noncalcareous; neutral (pH 7.3); clear, smooth boundary; horizon 0 to 12 inches thick.

C1—30 to 53 inches, gray (10YR 5/1) loam, very dark gray (10YR 3/1) when moist; many, fine, faint mottles of yellowish brown (10YR 5/4); massive; hard, firm, slightly sticky and slightly plastic; few fine roots; few fine pores; noncalcareous; mildly alkaline (pH 7.5); clear, smooth boundary; horizon 20 to 40 inches thick.

C2—53 to 60 inches, gray (10YR 5/1) loam, very dark gray (10YR 3/1) when moist; many, medium, distinct mottles of reddish brown (5YR 5/4); massive; hard, firm, slightly sticky and slightly plastic; few fine roots; few fine pores; slightly calcareous; moderately alkaline (pH 8.1).

Draper soils are somewhat poorly drained. Loam and gravelly loam are the only types mapped in the survey area. The content of organic matter in the A1 horizon ranges from about 3 to 12 percent. These soils are noncalcareous to slightly calcareous.

Other wet soils in the Alluvial great soil group are the Sunset, Martini, and Kirkham. Sunset soils are similar to Draper soils, but they were derived from mixed calcareous alluvium. Sunset soils are calcareous throughout and have very dark grayish-brown A1 horizons. Martini soils are calcareous throughout their profile. They are moderately coarse textured and highly stratified. Kirkham soils are calcareous throughout their profile. They are medium textured and moderately fine textured. Except for a small amount of organic matter in the surface layer, none of these soils shows any horizon development. Most of these soils are distinctly stratified.

For a detailed description of a profile of Sunset, Martini, and Kirkham soils, refer to "Descriptions of Soil Series and Profiles" at the back of this survey.

REGOSOLS

These are excessively drained and somewhat excessively drained azonal soils that have little profile development. They formed in unconsolidated material. These soils are similar in development to those in the Alluvial great soil group, but the unconsolidated material was mainly transported and deposited by wind. Preston soils on partially stabilized dunes are representative of this group.

A representative profile of Preston fine sand, duned, 1 to 10 percent slopes, 0.25 mile south and 300 feet east of the north quarter corner of section 10, T. 4 N., R. 1 W.:

A1—0 to 7 inches, dark-brown (10YR 4/3) fine sand, dark brown (10YR 3/3) when moist; very weak, coarse, granular structure that breaks readily to single grain; loose, nonsticky and nonplastic; abundant fine roots; noncalcareous; neutral (pH 7.0); gradual, smooth boundary; horizon 1 to 8 inches thick.

AC—7 to 20 inches, brown (10YR 5/3) fine sand, dark brown (10YR 3.5/3) when moist; single grain; loose, nonsticky and nonplastic; few fine and medium roots; noncalcareous; neutral (pH 7.0); gradual, smooth boundary; horizon 7 to 13 inches thick.

C1—20 to 48 inches, brown (7.5YR 5/4) fine sand, dark brown (7.5YR 4/4) when moist; single grain; loose, nonsticky and nonplastic; few medium roots; noncalcareous; neutral (pH 7.0); gradual, smooth boundary; horizon 10 to 30 inches thick.

C2—48 to 65 inches +, brown (7.5YR 5/4) fine sand, dark brown (7.5YR 4/4) when moist; single grain; loose, nonsticky and nonplastic; few medium roots; noncalcareous; mildly alkaline (pH 7.4).

The content of organic matter in the A1 horizon is very low, about 0.3 to 0.7 percent. In places the surface is covered with recently deposited fine sand that is 1 to 3 inches thick and is similar to the C horizons in color.

Francis is another soil in the Regosol great soil group. Like Preston soils, the Francis soils are coarse textured, but they have a slight amount of organic matter in their thin A1 horizon, which gives the soils a very dark grayish-brown color to a depth of about 13 inches.

For a detailed description of a profile of Francis soils, refer to "Descriptions of Soil Series and Profiles" at the back of this survey.

Descriptions of Soil Series and Profiles

In the following pages, each soil series not described in the section "Formation, Morphology, and Classification of Soils" is described briefly, and a profile representative of that series is described in detail. The location in the Davis-Weber Area of each profile is given.

Technical terms used in describing the profiles are defined in the Soil Survey Manual (*16*) and in the Glossary. Letters and numbers at the left designate the horizons in each soil profile. Combinations of letters and numbers in parentheses, such as (10YR 5/1), give the Munsell notation of the color of a soil in terms of hue, value, and chroma. This notation is more precise than the descriptive word, such as yellowish brown, which is also

given. The color is given for both dry and wet soil. Slightly hard, friable, sticky and plastic, and like terms used in that order, means slightly hard when dry, friable when moist, and sticky when wet.

ABBOTT SERIES: The Abbott series consists of deep, fine-textured, poorly drained, calcareous Alluvial soils. They formed in depressions on lake terraces from mixed alluvium.

Profile of Abbott clay 1,100 feet south and 280 feet east of the north quarter corner of section 34, T. 6 N., R. 2 W., Salt Lake base meridian:

A1—0 to 6 inches, gray (5Y 6/1) clay, gray (5Y 5/1) when moist; massive; extremely hard, very firm, very sticky and very plastic; plentiful medium roots; few fine pores; strongly calcareous; very strongly alkaline (pH 9.9); clear, smooth boundary; horizon 2 to 7 inches thick.

C1—6 to 37 inches, light-gray (5Y 7/1) clay, gray (5Y 6/1) when moist; massive; extremely hard, very firm, very sticky and plastic; few medium and few fine roots; few very fine pores; few, fine, distinct mottles of light olive brown; strongly calcareous; strongly alkaline (pH 8.7); clear, wavy boundary; horizon 24 to 36 inches thick.

IIC2—37 to 46 inches, white (2.5Y 8/2) very fine sandy clay loam, light gray (2.5Y 7/2) when moist; massive; slightly hard, friable, sticky and plastic; few medium roots; few fine pores; few, medium, distinct mottles of olive; strongly calcareous; moderately alkaline (pH 8.3); gradual, wavy boundary; horizon 8 to 12 inches thick.

IIIC3—46 to 61 inches +, light-gray (5Y 7/1) loamy very fine sand, light gray (5Y 6/1) when moist; massive; soft, very friable, nonsticky and nonplastic; few very fine pores; moderately calcareous; moderately alkaline (pH 8.4).

Clay is the only soil type mapped in the survey area. Texture of A1 horizon ranges from clay to silty clay. When moist, the A1 horizon ranges from gray to dark gray in color. The content of organic matter ranges from 1.2 to 2.5 percent. The A1 horizon is moderately to strongly calcareous, and in most places contains 50 to 100 percent exchangeable sodium. When moist, the C horizon ranges from gray to light gray or greenish gray in color. The texture of the C horizon is mainly clay, but it ranges from clay to heavy sandy clay loam. Mottles in the C horizon range from none to common. Depth to the water table in most places ranges from about 8 to 24 inches. Some areas are ponded at times.

AIRPORT SERIES: The Airport series consists of deep, medium-textured and moderately fine textured, somewhat poorly drained and poorly drained, calcareous, medial Solonetz soils. These soils formed on low lake terraces in lake sediments that were derived from a mixture of many kinds of rocks.

Profile of Airport silty clay loam 0.3 mile west and 100 feet north of the southeast corner of section 22, T. 2 N., R. 1 W., Salt Lake base meridian:

A1—0 to 6 inches, gray (10YR 5/1) silty clay loam, very dark gray (10YR 3/1) when moist; surface 1 inch has weak, thin, platy structure; rest of horizon has moderate, medium and fine, subangular blocky structure; slightly hard, friable, sticky and plastic; abundant fine roots; common, medium and fine, vesicular pores; strongly calcareous; moderately alkaline (pH 8.1); clear, smooth boundary; horizon 5 to 12 inches thick.

B2tca—6 to 19 inches, gray (10YR 5/1) silty clay loam, very dark gray (10YR 3/1) when moist; moderate, medium, prismatic structure that breaks readily to moderate, medium and fine, blocky structure; hard, firm, sticky and plastic; few fine roots; few fine pores; common thin clay films on peds; strongly calcareous; distinct white splotches of lime; strongly alkaline (pH 8.5); clear, smooth boundary; horizon 6 to 15 inches thick.

B3cag—19 to 32 inches, light-gray (5Y 7/2) silty clay loam, olive gray (5Y 5/2) when moist; moderate, medium, blocky structure; extremely hard, very firm, sticky and very plastic; few fine roots; few fine pores; cleavage planes stained dark with coating of organic matter; very strongly calcareous; distinct white splotches of lime; strongly alkaline (pH 8.8); clear, smooth boundary; horizon 9 to 16 inches thick.

C1g—32 to 40 inches, light-gray (5Y 7/2) silty clay loam, olive gray (5Y 5/2) when moist; weak, medium, subangular blocky structure; extremely hard, very firm, sticky and plastic; few fine roots; few fine pores; strongly calcareous; distinct white splotches of lime; strongly alkaline (pH 8.8); clear, smooth boundary; horizon 0 to 30 inches thick.

C2g—40 to 60 inches, very pale brown (10YR 7/3) silty clay loam, brown (10YR 5/3) when moist; massive; very hard, firm, sticky and plastic; few fine pores; many, faint, medium mottles of yellowish brown (10YR 5/4); strongly calcareous; strongly alkaline (pH 8.5).

Silt loam and silty clay loam soil types have been mapped in the survey area. When moist, the A1 horizon ranges from very dark gray to very dark grayish brown in color. The content of organic matter ranges from 1.5 to 6 percent. The A1 horizon is moderately to strongly calcareous, and in most places is less than 15 percent exchangeable sodium. Structure of the B2t horizon ranges from moderate to strong and from prismatic to blocky. Peds in this horizon have common, thin or continuous clay films. When moist, the B2t horizon ranges from dark grayish brown or brown to light gray or light brownish gray in color with hues of 10YR and 2.5Y. In most places, the B2t horizon is silty clay loam, but in some places it is silty clay. Exchangeable sodium in the B2t horizon ranges from 30 to 50 percent. Depth to the water table fluctuates between 20 and 60 inches. Mottles occur below the horizons of carbonate accumulation, or at depths ranging from 30 to 45 inches.

BARTON SERIES: The Barton series consists of gravelly, cobbly, and stony, medium-textured, well-drained minimal Chestnut soils. These soils occur on steep hills above the surrounding lake plain. Parent materials are medium-textured and moderately coarse textured, cobbly and stony colluvium and residuum that were derived dominantly from weathered tillite.

Profile of Barton rocky loams, 5 to 30 percent slopes, 1,000 feet west and 350 feet north from the center of section 7, T. 6 N., R. 3 W.:

A11—0 to 5 inches, dark grayish-brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) when moist; weak, medium, granular structure; soft, friable, slightly sticky and nonplastic; abundant fine roots; few fine pores; noncalcareous; neutral (pH 7.4); clear, smooth boundary; horizon 3 to 6 inches thick.

A12—5 to 13 inches, dark grayish-brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) when moist; weak, medium, granular structure; slightly hard, friable, slightly sticky and slightly plastic; abundant fine roots; common fine pores; noncalcareous; neutral (pH 7.1); clear, smooth boundary; horizon 4 to 10 inches thick.

B2t—13 to 19 inches, dark grayish-brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) when

moist; weak, medium, subangular blocky and granular structure; slightly hard, friable, slightly sticky and slightly plastic; plentiful fine roots; common fine pores; common thin clay films; noncalcareous; neutral (pH 7.0); clear, wavy boundary; horizon 4 to 8 inches thick.

C1—19 to 31 inches, brown (10YR 5/3) very cobbly loam, dark grayish brown (2.5Y 4/2) when moist; massive; slightly hard, friable, slightly sticky and nonplastic; few fine roots; few fine pores; noncalcareous; neutral (pH 7.6); horizon 10 to 18 inches thick.

C2—31 to 35 inches, light brownish-gray (10YR 6/2) very stony sandy loam, dark grayish brown (10YR 4/2) when moist; single grain; neutral.

Barton stony loam, Barton gravelly loam, and Rock outcrop were mapped together as Barton rocky loams. When moist, the A1 horizon ranges from very dark grayish brown to very dark brown. The content of organic matter ranges from 1 to 4 percent. The weak B2t horizon ranges from gravelly, cobbly, or stony loam to gravelly, cobbly, or stony heavy sandy loam in texture. When moist, the B2t horizon ranges from very dark grayish brown to dark grayish brown in color.

CHANCE SERIES: The Chance series consists of deep, black, medium-textured, poorly drained Humic Gley soils. These soils occur in areas where alluvial fans merge with lake plains and in depressions on low lake terraces. Parent materials were derived dominantly from weathered gneiss, schist, and granite.

Profile of Chance loam, 0 to 3 percent slopes, 1,350 feet north and 1,000 feet west of the southwest quarter corner of section 13, T. 3 N., R. 1 W.:

A11—0 to 3 inches, dark-gray (10YR 4/1) loam, black (10YR 2/1) when moist; moderate, fine, granular structure; slightly hard, friable, slightly sticky and slightly plastic; abundant fine roots; few fine and medium pores; moderately calcareous; mildly alkaline (pH 7.8); abrupt, smooth boundary; horizon 2 to 8 inches thick.

A12—3 to 8 inches, dark-gray (10YR 4/1) loam, black (10YR 2/1) when moist; weak, medium, prismatic structure that breaks easily to moderate, medium, subangular blocky structure; hard, firm, slightly sticky and slightly plastic; abundant fine roots; few medium pores; noncalcareous; mildly alkaline (pH 7.7); abrupt, smooth boundary; horizon 3 to 8 inches thick.

AC—8 to 19 inches, dark-gray (2.5Y 4/1) silt loam, very dark gray (2.5Y 3/1) when moist; moderate, medium, subangular blocky structure; hard, firm, slightly sticky and slightly plastic; plentiful fine roots; few fine pores; common, medium, distinct mottles of yellowish brown (10YR 5/6); noncalcareous; mildly alkaline (pH 7.4); abrupt, smooth boundary; horizon 6 to 15 inches thick.

C1g—19 to 41 inches, light brownish-gray (2.5Y 6/2) loamy fine sand, grayish brown (2.5Y 5/2) when moist; massive; soft, very friable, nonsticky and nonplastic; few fine roots; few fine distinct mottles of yellowish brown (10YR 5/6); noncalcareous; moderately alkaline (pH 8.2); abrupt, smooth boundary; horizon 20 to 40 inches thick.

C2g—41 to 57 inches, light brownish-gray (2.5Y 6/2) loamy fine sand, grayish brown (2.5Y 5/2) when moist; massive; soft, very friable, nonsticky and nonplastic; common, medium, distinct mottles of yellowish brown (10YR 5/6); slightly calcareous; moderately alkaline (pH 8.2); abrupt, smooth boundary; horizon 0 to 25 inches thick.

C3g—57 to 72 inches, light brownish-gray (2.5Y 6/2) fine sandy loam, gray (2.5Y 5/1) when moist; massive; soft, very friable, slightly sticky and slightly plastic; few, fine, distinct mottles of yellowish brown (10YR 5/6); slightly calcareous; moderately alkaline (pH 8.0).

Texture of the A1 horizon is loam, but it is nearly silty clay loam in places. The content of organic matter ranges from 4 to 20 percent. The A1 horizons are normally noncalcareous, but in places they are slightly to moderately calcareous because calcareous sediments have been deposited by wind or by floodwaters high in carbonate. Texture to a depth of 10 to 40 inches is dominantly fine sandy loam but ranges to loamy fine sand. Considerable stratification occurs in the C horizons. Mottles begin in or immediately below the A1 horizons and extend throughout the C horizons. Most generally the water table is within a depth of 30 inches from the surface.

CROY SERIES: The Croy series consists of medium-textured, somewhat poorly drained Solonetz soils that are moderately deep over an indurated pan. This pan is insoluble in either acid or alkali. These soils occur in slight depressions on low lake terraces immediately below the breaks from higher terraces. Parent materials consisted of medium-textured and moderately fine textured alluvium and mixed lake sediments that were derived from a mixture of many kinds of rocks.

Profile of Croy loam (0 to 1 percent slopes) near the exact center of section 8, T. 5 N., R. 2 W.:

A2—0 to 4 inches, light brownish-gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) when moist; weak, thin, platy structure that breaks to moderate, fine, granular structure; soft, very friable, slightly sticky and slightly plastic; abundant medium roots; common fine pores; moderately calcareous; moderately alkaline (pH 8.0); clear, smooth boundary; horizon 2 to 4 inches thick.

B21t—4 to 10 inches, brown (7.5YR 5/2) loam, dark brown (7.5YR 3/2) when moist; weak prismatic structure that breaks to moderate, medium, subangular blocky structure; hard, friable, sticky and slightly plastic; plentiful fine and medium roots; common fine pores; common thin clay films; moderately calcareous; strongly alkaline (pH 8.8); clear, smooth boundary; horizon 3 to 8 inches thick.

B22t—10 to 18 inches, brown (7.5YR 5/3) sandy clay loam, dark brown (7.5YR 3/3) when moist; weak prismatic structure that breaks to moderate, medium, subangular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; few fine roots; common fine and medium pores; common thin clay films; moderately calcareous; very strongly alkaline (pH 9.4); clear, wavy boundary; horizon 6 to 12 inches thick.

C1—18 to 24 inches, brown (7.5YR 5/3) sandy loam, dark brown (7.5YR 3/3) when moist; weak, medium, subangular blocky structure that breaks to weak, medium, granular structure; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; common fine and medium pores; moderately calcareous; very strongly alkaline (pH 9.5); clear, wavy boundary; horizon 4 to 8 inches thick.

C2—24 to 32 inches, light brownish-gray (10YR 6/2) fine sand, very dark grayish brown (10YR 3/2) when moist; single grain; loose, nonsticky and nonplastic; few medium roots; few fine pores; moderately calcareous; very strongly alkaline (pH 9.5); abrupt, smooth boundary; horizon 5 to 10 inches thick.

C3m—32 to 35 inches +, light-gray to gray (10YR 6/1) indurated hardpan, dark gray (10YR 4/1) when moist; moderately calcareous; few fine and medium pores.

Loam is the only soil type mapped in the survey area. In places there is a weak A1 horizon 1 to 3 inches thick. When moist, the A2 horizon ranges from dark grayish brown to brown. The content of organic matter in the surface layer ranges from 1 to 3 percent. The B2t horizons have weak prismatic and moderate subangular

blocky structure and thin, patchy to continuous clay films on the peds. In texture, the B2t horizons range from loam to sandy clay loam or silty clay loam. The B2t horizons are moderately calcareous to strongly calcareous. They have a hue of 7.5YR, and when moist their color ranges from dark brown to brown. Exchangeable sodium in the B2t horizons ranges from 13 to 40 percent. The indurated pan is insoluble in either hot or cold acid or alkali and does not break down under alternate treatment. Depth to the hardpan ranges from 20 to 42 inches. This layer ranges from about 3 to 40 inches in thickness. The water table fluctuates seasonally, but it is dominantly at a depth of 24 to 48 inches.

CUDAHY SERIES: The Cudahy series consists of medium-textured, very strongly calcareous, poorly drained Solonchak soils that are moderately deep over a lime-cemented pan. These soils occur on nearly level low lake terraces. They formed in mixed calcareous lake sediments that were derived from a mixture of many kinds of rocks. Ground water containing much lime has strongly influenced these soils.

Profile of Cudahy silt loam, 0 to 3 percent slopes, one-eighth of a mile south of the center of section 26, T. 2 N., R. 1 W.:

A1—0 to 6 inches, dark-gray (10YR 4/1) silt loam, black (10YR 2/1) when moist; moderate, thin, platy structure that breaks readily to moderate, fine, granular structure; hard, friable, slightly sticky and slightly plastic; abundant, fine and medium roots; many medium and fine pores; very strongly calcareous; moderately alkaline (pH 8.1); abrupt, smooth boundary; horizon 3 to 12 inches thick.

A12ca—6 to 16 inches, gray (10YR 5/1) silt loam, very dark gray (10YR 3/1) when moist; moderate, medium, prismatic structure that breaks to very fine, granular structure; very hard, firm, slightly sticky and slightly plastic; very strongly calcareous; strongly alkaline (pH 8.6); clear, smooth boundary; horizon 6 to 10 inches thick.

C1cag—16 to 23 inches, light-gray (2.5Y 7/1) heavy silt loam, gray (5Y 5/1) when moist; moderate, medium, platy structure that breaks to fine, subangular blocky structure; very hard, firm, sticky and plastic; few fine pores; few, fine, faint mottles of light yellowish brown (2.5Y 6/4); very strongly calcareous; moderately alkaline (pH 8.2); abrupt, wavy boundary; horizon 5 to 10 inches thick.

C2cam—23 to 31 inches, light-gray (5Y 7/1) indurated lime-cemented pan, gray (5Y 5/1) when moist; extremely hard, extremely firm; few fine pores; very strongly calcareous; moderately alkaline (pH 8.0); abrupt, wavy boundary; horizon 5 to 10 inches thick.

C3cam—31 to 44 inches, light-gray (2.5Y 7/1) weakly cemented pan (2.5Y 5/1) when moist; very hard, firm; many fine pores; very strongly calcareous; moderately alkaline (pH 8.2); clear, wavy boundary; horizon 10 to 18 inches thick.

C4g—44 to 60 inches, light-gray (5Y 7/1) silty clay loam, gray (5Y 5/1) when moist; massive; very hard, firm, sticky and plastic; few fine pores; common, fine, distinct mottles of dark yellowish brown (10YR 4/4); very strongly calcareous; moderately alkaline (pH 8.2).

Silt loam is the only soil type mapped in the survey area. When moist, the A1 horizons range from black to very dark gray. Faint to prominent mottles occur in and below the A1 horizons, and the mottles extend downward. The content of organic matter ranges from 4 to 12 percent. Depth to the hardpan ranges from 10 to 44 inches. Texture of the control section ranges from silt loam to silty clay loam. The water table fluctuates seasonally, but it is dominantly at a depth of 18 to 40 inches.

FORD SERIES: The Ford series consists of medium-textured, somewhat poorly drained Solonchak soils that are 20 to 40 inches deep over a lime-cemented hardpan. In most places these soils are in nearly level depressions in low lake terraces immediately below the terrace breaks. Parent materials were derived from mixed lake sediments.

Profile of Ford loam (0 to 1 percent slopes) 600 feet north and 200 feet west of the east quarter corner of section 17, T. 4 N., R. 2 W.:

A1—0 to 9 inches, grayish-brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) when moist; weak, medium and fine, granular structure; slightly hard, very friable, slightly sticky and slightly plastic; moderately calcareous; very strongly alkaline (pH 9.9); clear, smooth boundary; horizon 5 to 12 inches thick.

C1ca—9 to 16 inches, light brownish-gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) when moist; weak, medium, blocky structure; hard, friable, slightly sticky and slightly plastic; strongly calcareous; very strongly alkaline (pH 9.4); clear, smooth boundary; horizon 5 to 12 inches thick.

C2ca—16 to 34 inches, pinkish-gray (7.5YR 6/2) fine sandy loam, brown (7.5YR 4.5/2) when moist; massive; slightly hard, very friable, nonsticky and nonplastic; strongly calcareous; very strongly alkaline (pH 9.1); abrupt, smooth boundary; horizon 0 to 20 inches thick.

C3cam—34 to 44 inches, light-gray (10YR 7/2) fine sandy loam, grayish brown (10YR 5/2) when moist; strongly cemented; hard, brittle; strongly calcareous; strongly alkaline (pH 8.8); abrupt, wavy boundary; horizon 6 to 12 inches thick.

C4ca—44 to 52 inches, pinkish-gray (7.5YR 6.5/2) fine sandy loam, brown (7.5YR 5/2) when moist; massive or single grain; soft, loose, nonsticky and nonplastic; strongly calcareous; very strongly alkaline (pH 9.2); abrupt, smooth boundary; horizon 7 to 10 inches thick.

C5cam—52 to 60 inches +, pale-brown (10YR 6/3), strongly cemented, strongly calcareous pan.

Loam is the only soil type mapped in the survey area. When moist, the A1 horizon ranges from very dark grayish brown to dark grayish brown or dark brown. The content of organic matter in this horizon ranges from 1 to 4 percent. Texture of the control section is dominantly loam or silt loam, but it ranges from fine sandy loam to light silty clay loam. The pan ranges from strongly cemented to indurated. Several pans often occur in a single profile, and range from 3 to 24 inches in thickness. These pans are separated by lenses of fine sandy loam. Depth to the hardpan ranges from 20 to 40 inches. Undrained areas of Ford soils are saturated with water for long periods during the year. The water table fluctuates seasonally. Depth to the water table ranges from 10 to 60 inches, but it is commonly 30 to 36 inches. The hardpans are very slowly permeable.

FRANCIS SERIES: The Francis series consists of deep, coarse-textured, noncalcareous, well-drained Regosols. These soils occur on intermediate and high terraces. They formed in dominantly loamy fine sand lakeshore sediments that have been reworked by wind. Parent materials were derived from a mixture of many kinds of rocks, mainly quartzite, sandstone, gneiss, and granite.

Profile of Francis loamy fine sand, 0 to 3 percent slopes, 300 feet east and 275 feet south of the northwest corner of section 24, T. 5 N., R. 2 W.:

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) loamy fine sand, very dark grayish brown (10YR 3/2) when moist; weak, fine, granular structure; slightly hard, friable, nonsticky and nonplastic; plentiful fine roots; few fine and medium pores; noncalcareous; mildly alkaline (pH 7.8); clear, smooth boundary; horizon 5 to 8 inches thick.

A12—7 to 13 inches, brown (10YR 5/3) loamy fine sand, dark brown (10YR 3/3) when moist; weak, fine, granular structure; soft, friable, nonsticky and nonplastic; plentiful fine roots; few, fine and medium pores; noncalcareous; mildly alkaline (pH 7.7); clear, smooth boundary; horizon 4 to 8 inches thick.

C1—13 to 23 inches, brown (10YR 5/3) loamy fine sand, dark brown (10YR 4/3) when moist; massive; soft, very friable, nonsticky and nonplastic; few fine roots; few fine pores; noncalcareous; moderately alkaline (pH 7.9); clear, smooth boundary; horizon 3 to 12 inches thick.

C2—23 to 73 inches +, brown (7.5YR 5/4) fine sand, dark brown (7.5YR 4/4) when moist; single grain; loose, nonsticky and nonplastic; few fine roots; few fine pores; noncalcareous; mildly alkaline (pH 7.8); gradual, smooth boundary.

Loamy fine sand is the only soil type mapped in the survey area. When moist, the A horizons range from very dark grayish brown to dark brown. The content of organic matter in these horizons ranges from 1 to 3 percent. Texture of the control section is loamy fine sand. The C horizons range from loamy fine sand to fine sand in texture. In places, Francis soils are gravelly below a depth of 48 inches, and in some places the C horizons are slightly to moderately calcareous below a depth of 60 inches.

GOOCH SERIES: The Gooch series consists of deep, medium-textured, poorly drained and somewhat poorly drained Solonchak soils. These soils occur in depressions on low lake terraces. They formed in medium-textured and moderately fine textured mixed lake sediments that were derived from many kinds of rocks.

Profile of Gooch silt loam, one-fourth mile north and 400 feet west of the southeast corner of section 27, T. 7 N., R. 2 W.:

A1—0 to 8 inches, gray (2.5Y 6/1) silt loam, dark gray (2.5Y 4/1) when moist; moderate and weak, medium, platy structure; slightly hard, friable, slightly sticky and slightly plastic; plentiful medium roots; few fine pores; strongly calcareous; moderately alkaline (pH 8.3); clear, smooth boundary; horizon 5 to 8 inches thick.

C1cag—8 to 18 inches, light-gray (5Y 7/1) clay loam, gray (5Y 6/1) when moist; moderate, medium, subangular blocky structure; hard, firm, sticky and plastic; few medium roots; common medium pores; very strongly calcareous; strongly alkaline (pH 8.5); clear, smooth boundary; horizon 8 to 11 inches thick.

C2cag—18 to 30 inches, white (5Y 8/1) clay loam, gray (5Y 6/1) when moist; massive; hard, firm, sticky and plastic; few fine roots; few fine pores; few fine, distinct mottles of yellowish brown (10YR 5/6); strongly calcareous; strongly alkaline (pH 8.8); clear, smooth boundary; horizon 10 to 23 inches thick.

IIC3—30 to 47 inches +, very pale brown (10YR 7/3) fine sandy loam, brown (10YR 5/3) when moist; massive; slightly hard, friable, nonsticky and nonplastic; few fine pores; common, medium, distinct mottles of yellowish brown (10YR 5/8); moderately calcareous; strongly alkaline (pH 9.0).

Silt loam is the only soil type mapped in the survey area. When moist, the A1 horizon ranges from dark gray to gray in hues of 2.5Y and 10YR. The content of organic matter ranges from 1 to 5 percent. Exchangeable sodium in the A1 horizon ranges from 10 to 40 percent. When moist, the Cca horizons range from gray to light gray in hues of 2.5Y and 5Y. The Cca horizons are loam, silt loam, or light silty clay loam in texture. The content of calcium carbonate in these horizons ranges from 25 to 75 percent, and the exchangeable sodium ranges from 10 to 45 percent. Faint to distinct mottles occur in or immediately below the A1 horizon. In undrained Gooch soils, the water table is at or near the surface most of the time.

HARRISVILLE SERIES: The Harrisville series consists of deep, medium-textured, somewhat poorly drained and moderately well drained medial Solonetz soils. These soils occur on intermediate lake terraces. They formed in lake sediments and alluvium that were derived from many kinds of rocks, mainly quartzite, sandstone, limestone, and granite.

Profile of Harrisville silt loam, 0 to 1 percent slopes, 300 feet north and 600 feet east of the center of section 31, T. 7 N., R. 1 W.:

Ap—0 to 8 inches, grayish-brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) when moist; weak, coarse and medium, granular structure; hard, friable, slightly sticky and slightly plastic; few fine and medium roots; few fine pores; slightly calcareous; moderately alkaline (pH 8.0); abrupt, smooth boundary; horizon 6 to 9 inches thick.

B21t—8 to 14 inches, pale-brown (10YR 6/3) silty clay loam, dark brown (7.5YR 4/3) when moist; weak, coarse, prismatic structure that breaks to moderate, medium, subangular blocky structure; very hard, firm, sticky and plastic; few fine and medium roots; common fine pores; thin continuous clay films; moderately calcareous; strongly alkaline (pH 8.8); clear, smooth boundary; horizon 5 to 8 inches thick.

B22tca—14 to 22 inches, pink (7.5YR 7/3) heavy silty clay loam, brown (7.5YR 5/3) when moist; moderate, medium, subangular blocky structure; very hard, firm, sticky and plastic; few fine roots; common fine pores; common thin clay films; strongly calcareous; strongly alkaline (pH 9.0); clear, wavy boundary; horizon 7 to 11 inches thick.

B3ca—22 to 33 inches, pink (7.5YR 7/3) silty clay loam, brown (10YR 5/3) when moist; weak, medium, subangular blocky structure; very hard, firm, slightly sticky and very plastic; few fine roots; common fine pores; strongly calcareous; strongly alkaline (pH 9.0); clear, wavy boundary; horizon 8 to 12 inches thick.

C1—33 to 45 inches, pink (7.5YR 7/4) silty clay loam, brown (10YR 5/3) when moist; massive; extremely hard, firm, sticky and very plastic; few medium pores; common, fine, faint mottles of dark yellowish brown (10YR 4/4); strongly calcareous; very strongly alkaline (pH 9.2); clear, smooth boundary; horizon 12 to 20 inches thick.

C2—45 to 60 inches, pink (7.5YR 7/4) silty clay loam, brown (7.5YR 5/4) when moist; massive; extremely hard, firm, sticky and very plastic; few fine pores; few, fine, distinct mottles of yellowish brown (10YR 5/8); strongly calcareous; strongly alkaline (pH 9.0).

Silt loam is the only soil type mapped in the survey area. When moist, the A horizon ranges from very dark grayish brown to dark brown. The content of organic matter ranges from 1.5 to 4 percent. In most places the texture of the B2t horizons is silty clay loam. The structure of this horizon is weak to moderate prismatic, and the clay films on peds range from patchy to continuous. The B2t horizons are moderately to strongly calcareous, and the exchangeable sodium ranges from 5 to 25 percent. When moist, these horizons range from

dark brown to brown in hues of 7.5YR and 10YR. Faint to distinct mottles occur at a depth ranging from 30 to 42 inches. The water table fluctuates seasonally, but it is commonly within a depth of 40 inches.

IRONTON SERIES: The Ironton series consists of medium-textured, somewhat poorly drained and moderately well drained Solonchak soils. These soils occur on low lake terraces, alluvial fans, and flood plains. They formed in medium-textured alluvium and lake sediments that were derived from a mixture of many kinds of rocks, dominantly limestone, quartzite, and gneiss.

Profile of moderately well drained Ironton silt loam, 0 to 1 percent slopes, 300 feet north and 100 feet east of the southwest corner of section 6, T. 2 N., R. 1 E.:

A11—0 to 6 inches, gray (10YR 5/1) silt loam, very dark gray (10YR 3/1) when moist; moderate, medium and fine, granular structure; slightly hard, friable, slightly sticky and slightly plastic; abundant fine roots; few medium pores; strongly calcareous; moderately alkaline (pH 8.3); gradual, smooth boundary; horizon 4 to 8 inches thick.

A12—6 to 16 inches, gray (10YR 5/1) silt loam, very dark gray (10YR 3/1) when moist; moderate, medium and coarse, granular structure; slightly hard, friable, slightly sticky and slightly plastic; abundant fine roots; common fine pores; strongly calcareous; moderately alkaline (pH 8.0); gradual, wavy boundary; horizon 8 to 15 inches thick.

A13ca—16 to 21 inches, gray (10YR 5/1) loam, very dark grayish brown (10YR 3/2) when moist; weak, medium and coarse, subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; plentiful fine roots; common fine and medium pores; very strongly calcareous; moderately alkaline (pH 8.0); clear, wavy boundary; horizon 0 to 8 inches thick.

C1ca—21 to 36 inches, light-gray (2.5Y 7/2) loam, grayish brown (2.5Y 5/2) when moist; massive; hard, friable, slightly sticky and slightly plastic; few fine roots; few fine pores; very strongly calcareous; weakly cemented; moderately alkaline (pH 8.1); gradual, wavy boundary; horizon 10 to 18 inches thick.

C2ca—36 to 48 inches, light-gray (2.5Y 7/2) silt loam, grayish brown (2.5Y 5/2) when moist; massive; weakly cemented; hard, firm, slightly sticky and slightly plastic; plentiful fine roots; few fine pores; few, fine, distinct mottles of yellowish brown (10YR 5/6); very strongly calcareous; moderately alkaline (pH 7.9); gradual, wavy boundary; horizon 9 to 15 inches thick.

C3—48 to 60 inches +, light-gray (2.5Y 7/2) silt loam, grayish brown (2.5Y 5/2) when moist; massive; hard, friable, slightly sticky and slightly plastic; strongly calcareous; moderately alkaline (pH 7.9).

Silt loam is the only soil type mapped in the survey area. When moist the A1 horizons range from very dark gray to very dark brown or black. The content of organic matter in these horizons ranges from 3 to 10 percent. The A1 horizons are moderately to strongly calcareous. Texture of the control section is dominantly silt loam. Faint to distinct mottles occur below a depth of 20 inches. The water table fluctuates seasonally, and the depth ranges from 20 to 60 inches.

KIDMAN SERIES: The Kidman series consists of deep, moderately coarse textured, well drained and moderately well drained Chestnut soils. These soils occur on broad, smooth to slightly undulating intermediate lake terraces. They formed in mixed lake sediments and shore deposits that have been extensively reworked by wind.

Profile of Kidman fine sandy loam, 0 to 1 percent slopes, 750 feet west and 1,400 feet north of the southeast corner of section 3, T. 3 N., R. 1 W.:

Ap—0 to 11 inches, brown (10YR 4/3) fine sandy loam, dark brown (10YR 3/3) when moist; weak, medium, granular structure; slightly hard, very friable, slightly sticky and slightly plastic; common fine and medium roots; few fine and medium pores; noncalcareous; mildly alkaline (pH 7.5); clear, smooth boundary; horizon 8 to 12 inches thick.

A12—11 to 17 inches, brown (10YR 4/3) fine sandy loam, dark brown (10YR 3/3) when moist; weak, medium, subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common fine and medium roots; few fine and medium pores; noncalcareous; neutral (pH 7.3); clear, wavy boundary; horizon 5 to 8 inches thick.

B2—17 to 27 inches, yellowish-brown (10YR 5/4) fine sandy loam, brown (7.5YR 4/3) when moist; weak, medium, subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine and medium roots; common fine pores; noncalcareous; neutral (pH 7.3); clear, wavy boundary; horizon 8 to 14 inches thick.

C1ca—27 to 37 inches, light yellowish-brown (10YR 6/4) fine sandy loam, brown (7.5YR 5/4) when moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine and medium roots; common fine and medium pores; strongly calcareous; disseminated lime; few fine filaments of lime; moderately alkaline (pH 7.9); clear, smooth boundary; horizon 8 to 16 inches thick.

C2ca—37 to 49 inches, light yellowish-brown (10YR 6/4) very fine sandy loam, brown (7.5YR 5/3) when moist; massive; slightly hard, very friable, nonsticky and slightly plastic; few fine roots; few fine and medium pores; strongly calcareous; lime in veins and spots; mildly alkaline (pH 7.8); gradual, wavy boundary; horizon 8 to 15 inches thick.

C3ca—49 to 58 inches, very pale brown (10YR 7/4) very fine sandy loam, light brown (7.5YR 6/4) when moist; massive; slightly hard, very friable, nonsticky and slightly plastic; few fine roots; few fine pores; strongly calcareous; lime in veins and spots; mildly alkaline (pH 7.8).

Fine sandy loam is the only soil type mapped in the survey area. When moist, the A horizons range from very dark brown to very dark grayish brown or dark brown. The content of organic matter in these horizons ranges from 1.5 to 4 percent. The B2 horizon is weak and ranges from fine sandy loam to light loam in texture. Clay films range from thin and patchy on some ped surfaces to coatings on sand grains. The A1 and B2 horizons are usually noncalcareous, but in places the A1 horizon is slightly calcareous. When moist, the B2 horizon ranges from dark brown to brown in hues of 10YR and 7.5YR. Mottles in the Cca and C horizons range from none to distinct. Depth to the water table ranges from 30 to more than 60 inches. Exchangeable sodium in the Cca and C horizons ranges from 3 to 25 percent.

KIRKHAM SERIES: The Kirkham series consists of deep, medium-textured or moderately fine textured, calcareous, somewhat poorly drained Alluvial soils. These soils occur on nearly level stream flood plains. They formed in mixed calcareous alluvium that was derived primarily from quartzite, limestone, sandstone, and granite.

Profile of Kirkham silty clay loam, 500 feet north and 100 feet west of the east quarter corner of section 1, T. 6 N., R. 3 W.:

Ap—0 to 7 inches, grayish-brown (10YR 5/2) silty clay loam, very dark grayish brown (10YR 3/2) when moist; weak, fine and medium, granular structure; very hard, firm, slightly sticky and plastic; plentiful fine roots; few fine and medium pores; moderately calcareous; mildly alkaline (pH 7.6); abrupt, smooth boundary; horizon 4 to 8 inches thick.

A12—7 to 13 inches, grayish-brown (10YR 5/2) light silty clay, very dark grayish brown (10YR 3/2) when moist; massive; extremely hard, firm, sticky and plastic; few fine roots; few fine pores; moderately calcareous; mildly alkaline (pH 7.7); clear, smooth boundary; horizon 3 to 11 inches thick.

C1—13 to 34 inches, light brownish-gray (10YR 6/2) silty clay loam, dark brown (10YR 3/3) when moist; massive; very hard, firm, sticky and plastic; few fine roots; many very fine pores; common, fine, faint mottles of dark yellowish brown (10YR 3/4); few fine shells; moderately calcareous; moderately alkaline (pH 8.1); clear, smooth boundary; horizon 18 to 45 inches thick.

C2—34 to 52 inches, pale-brown (10YR 6/3) silt loam, dark brown (10YR 4/3) when moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; common fine, and few medium pores; common, fine, faint mottles of dark yellowish brown (10YR 4/4); moderately calcareous; moderately alkaline (pH 8.2); clear, smooth boundary; horizon 0 to 20 inches thick.

C3—52 to 68 inches, pale-brown (10YR 6/3) fine sandy loam, dark brown (10YR 4/3) when moist; massive; slightly hard, very friable, nonsticky and nonplastic; few fine pores; common, fine, faint mottles of dark yellowish brown (10YR 4/4); moderately calcareous; moderately alkaline (pH 8.3).

The soil types mapped in the survey are silty clay loam and loam. When moist, the A horizons range from very dark grayish brown to dark brown. The content of organic matter in these horizons ranges from 1.5 to 5 percent. Texture of the control section is dominantly silty clay loam. Kirkham soils are moderately calcareous throughout the profile. Faint to distinct mottles occur at a depth of 20 to 40 inches. The water table fluctuates seasonally, but it is commonly at a depth of 30 to 40 inches. When these soils dry, many cracks form that are about ½ inch to 2 inches wide and 12 to 18 inches deep.

LAKESHORE SERIES: The Lakeshore series consists of deep, medium-textured and moderately coarse textured, calcareous, poorly drained and very poorly drained Solonchak soils. These soils occur on the low lake plain adjoining Great Salt Lake or in low flat areas adjoining inland ponds. They have a strong salt accumulation within a depth of 20 inches. Parent materials are reworked lakeshore deposits and mixed stratified lake sediments that were derived from many kinds of rocks.

Profile of Lakeshore silt loam, one-fourth mile east and 1,000 feet north of the southwest corner of section 17, T. 6 N., R. 3 W.:

A1sa—0 to 4 inches, light-gray (2.5Y 7/2) silt loam, grayish brown (2.5Y 5/2) when moist; weak, medium, platy structure; slightly hard, friable, slightly sticky and slightly plastic; no roots; many fine pores; salt crust one-eighth inch thick on surface; strongly calcareous; moderately alkaline (pH 8.1); clear, smooth boundary; horizon 2 to 5 inches thick.

C1sa—4 to 8 inches, pale-yellow (2.5Y 7/3) silt loam, light olive brown (2.5Y 5/3) when moist; massive; soft, very friable, slightly sticky and slightly plastic; many fine and medium pores; common, medium, prominent mottles of yellowish brown (10YR 5/6); strongly calcareous; moderately alkaline (pH 8.0); clear, smooth boundary; horizon 3 to 15 inches thick.

C2sa—8 to 13 inches, pale-yellow (5Y 7/3) very fine sandy loam, olive (5Y 5/3) when moist; massive; soft, very friable, nonsticky and nonplastic; common medium and fine pores; common, fine, distinct mottles of light olive brown (2.5Y 5/6); moderately calcareous; moderately alkaline (pH 8.1); clear, wavy boundary; horizon 0 to 8 inches thick.

C3sa—13 to 19 inches, pale-yellow (5Y 7/3) loam, olive (5Y 5/3) when moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; common medium pores; common, medium, distinct mottles of light olive brown (2.5Y 5/6); moderately calcareous; mildly alkaline (pH 7.7); clear, smooth boundary; horizon 4 to 11 inches thick.

C4sa—19 to 51 inches, pale-yellow (5Y 7/3) silt loam, olive (5Y 5/3) when moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; few fine and medium pores; common, fine, distinct mottles of light olive brown (2.5Y 5/6); moderately calcareous; mildly alkaline (pH 7.7); clear, wavy boundary; horizon 12 to 20 inches thick.

C5g—51 to 64 inches, gray (5Y 6/1) silt loam, dark gray (5Y 4/1) when moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine and medium pores; moderately calcareous; neutral (pH 7.0).

Silt loam and fine sandy loam are the soil types mapped in the survey area. The surface is generally crusted with salts that are mainly sodium chloride. When moist, the A1 and C1 horizons range from brownish gray to light brownish gray or gray in hues of 2.5Y and 5Y. Distinct and prominent mottles occur throughout the profile. Lakeshore soils are moderately calcareous throughout their profile. The water table is at or near the surface most of the time.

LAYTON SERIES: The Layton series consists of deep, coarse-textured, well drained and moderately well drained minimal Chestnut soils. These soils occur on intermediate lake terraces. They formed in coarse-textured lakeshore sediments that have been reworked by wind. These sediments were derived from many kinds of parent rocks.

Profile of Layton loamy fine sand, 0 to 3 percent slopes, moderately well drained, 1,750 feet east and 200 feet south of the northwest corner of section 4, T. 6 N., R. 2 W.:

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) loamy fine sand, very dark grayish brown (10YR 3/2) when moist; weak, fine, granular structure; slightly hard, very friable, nonsticky and nonplastic; plentiful fine roots; few fine pores; noncalcareous; mildly alkaline (pH 7.4); clear, smooth boundary; horizon 6 to 9 inches thick.

A12—7 to 15 inches, grayish-brown (10YR 5/2) loamy fine sand, very dark grayish brown (10YR 3/2) when moist; weak, very fine, granular structure; slightly hard, friable, nonsticky and nonplastic; noncalcareous; mildly alkaline (pH 7.4); clear, smooth boundary; horizon 5 to 9 inches thick.

C1—15 to 23 inches, brown (10YR 5/3) loamy fine sand, dark brown (10YR 3/3) when moist; weak, coarse, subangular blocky structure; hard, friable, nonsticky and nonplastic; few fine roots; common fine pores; noncalcareous; moderately alkaline (pH 7.9); clear, wavy boundary; horizon 5 to 10 inches thick.

C2—23 to 29 inches, brown (10YR 5/3) loamy fine sand, dark brown (10YR 4/3) when moist; weak, coarse, subangular blocky structure; hard, friable, nonsticky and nonplastic; few fine roots; few fine pores; common, fine, faint mottles of dark yellowish brown (10YR 3/4); few krotovinas ¼ to ½ inch in diameter; slightly calcareous; moderately alkaline (pH 8.1); clear, wavy boundary; horizon 5 to 12 inches thick.

C3ca—29 to 66 inches, very pale brown (10YR 7/3) loamy fine sand, brown (10YR 5/3) when moist; massive; slightly hard, friable, nonsticky and nonplastic; few fine pores; few, medium, faint mottles of yellowish brown (10YR 5/6); moderately calcareous; strongly alkaline (pH 8.8).

Loamy fine sand is the only soil type mapped in the survey area. When moist, the A horizons range from dark brown to very dark brown. The content of organic matter in these horizons ranges from 1 to 2 percent. The texture of the C horizon is dominantly loamy fine sand, but ranges to light fine sandy loam. When moist, the C horizon ranges from dark brown to brown.

LOGAN SERIES: The Logan series consists of deep, moderately fine textured, poorly drained and very poorly drained Solonchak soils. These soils formed in alluvium and lake sediments on nearly level lake terraces.

Profile of Logan silty clay loam, 1,000 feet west and 400 feet north of the center of section 23, T. 2 N., R. 1 W.:

Ap—0 to 5 inches, dark-gray (10YR 4/1) silty clay loam, black (10YR 2/1) when moist; moderate, medium, granular structure; slightly hard, friable, slightly sticky and plastic; abundant fine roots; many medium and fine pores; strongly calcareous; moderately alkaline (pH 8.2); clear, smooth boundary; horizon 5 to 10 inches thick.

A12—5 to 12 inches, dark-gray (10YR 4/1) silty clay loam, black (10YR 2/1) when moist; moderate, medium to fine, subangular blocky structure; hard, firm, sticky and plastic; plentiful medium and fine roots; many fine pores; strongly calcareous; moderately alkaline (pH 8.1); clear, wavy boundary; horizon 5 to 15 inches thick.

C1cag—12 to 29 inches, light-gray (5Y 7/1) silty clay loam, olive gray (5Y 5/1) when moist; weak, fine, subangular blocky structure; extremely hard, firm, sticky and plastic; few fine roots; few fine pores; strongly calcareous; moderately alkaline (pH 8.1); many, coarse, faint mottles of light gray (5Y 7/2) (lime); smooth boundary; horizon 5 to 20 inches thick.

C2cag—29 to 46 inches, white (2.5Y 8/2) silt loam, light brownish gray (2.5Y 6/2) when moist; massive; extremely hard, firm, sticky and plastic; few fine roots; few fine pores; many, medium, distinct mottles of dark yellowish brown (10YR 4/4); strongly calcareous; moderately alkaline (pH 8.1); abrupt, smooth boundary; horizon 10 to 20 inches thick.

C3g—46 to 60 inches, pale-yellow (5Y 7.2) stratified fine sand, fine sandy loam, and silty clay, olive (5Y 5/3) when moist; massive; many, coarse, distinct mottles of olive brown (2.5Y 4/4); strongly calcareous; moderately alkaline (pH 8.1).

In places there is a peaty A horizon as much as 5 inches thick, but silty clay loam is the only soil type mapped in the survey area. When moist, the A horizons range from black to very dark gray. The calcium carbonate equivalent of this layer ranges from 5 to 25 percent. Texture of the control section is mainly silty clay loam, but it ranges to light silty clay. The Cca horizons have a calcium carbonate equivalent ranging from 15 to 60 percent. The C horizons consist of stratified, fine-textured to coarse-textured, mixed lake sediments or alluvium. In very poorly drained areas, the water table is commonly within a depth of 18 inches, and in poorly drained areas, it is at a depth of 20 to 40 inches.

MARRIOTT SERIES: The Marriott series consists of deep, somewhat excessively drained, gravelly and cobbly, moderately coarse textured Chestnut soils. These soils occur on moderately steep to very steep delta and terrace escarpments. Their parent materials were derived from mixed rocks, dominantly quartzite, sandstone, and granite.

Profile of eroded Marriott gravelly sandy loam (in Hillfield-Marriott complex), 30 to 60 percent slopes, eroded, 950 feet west and 900 feet north of the east quarter corner of section 12, T. 5 N., R. 2 W.:

A11—0 to 2 inches, dark grayish-brown (10YR 4/2) gravelly sandy loam, very dark brown (10YR 2/2) when moist; weak, fine and medium, granular structure; soft, very friable, nonsticky and nonplastic; abundant fine roots; few fine pores; noncalcareous; mildly alkaline (pH 7.4); clear, smooth boundary; horizon 1 to 3 inches thick.

A12—2 to 8 inches, brown to dark-brown (10YR 4/3) gravelly fine sandy loam, dark brown (7.5YR 3/3) when moist; very weak, fine, granular and fine, subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; plentiful fine roots; few fine pores; noncalcareous; mildly alkaline (pH 7.6); clear, smooth boundary; horizon 4 to 8 inches thick.

B21—8 to 11 inches, brown (7.5YR 5/4) gravelly fine sandy loam, dark brown (7.5YR 4/3) when moist; weak, medium, subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; few fine roots; few fine pores; noncalcareous; mildly alkaline (pH 7.4); clear, smooth boundary; horizon 3 to 7 inches thick.

B22—11 to 22 inches, brown (7.5YR 5/4) gravelly fine sandy loam, dark brown (7.5YR 4/4) when moist; weak, medium, subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; few fine roots; few fine and medium pores; slightly calcareous; mildly alkaline (pH 7.6); clear, smooth, boundary; horizon 4 to 12 inches thick.

Cca—22 to 61 inches, light-brown (7.5YR 6/4) gravelly fine sandy loam, brown (7.5YR 5/4) when moist; massive; soft, very friable, nonsticky and nonplastic; very few fine roots; few fine and medium pores; moderately calcareous; mildly alkaline (pH 7.7).

Cobbly sandy loam and gravelly sandy loam types are mapped in the survey area. The A1 horizons are generally noncalcareous, but are slightly calcareous in places. The pH value ranges from 6.7 to 7.4. When moist, these horizons range from very dark brown to dark brown. The content of organic matter ranges from 1 to 2.5 percent. Pebbles and cobbles make up from 15 to 40 percent of the A1 horizon, by volume. Texture of the control section ranges from gravelly fine sandy loam to gravelly loamy fine sand.

MARRIOTT, CALCAREOUS VARIANT: Calcareous variants from the Marriott series are deep, gravelly, moderately coarse textured, well-drained Alluvial soils. These soils occur on alluvial-colluvial fans that consist of material deposited on high lake terraces. This material was derived from a mixture of rocks that were mainly of limestone, quartzite, argillite, and shale.

Profile of Marriott gravelly sandy loam, calcareous variant, 10 to 20 percent slopes, eroded, 750 feet east and 200 feet north of the southwest corner of section 13, T. 7 N., R. 2 W.:

Ap—0 to 9 inches, grayish-brown (10YR 5/2) gravelly sandy loam, very dark grayish brown (10YR 3/2) when moist; weak, fine and medium, granular structure; slightly hard, friable, nonsticky and nonplastic; few medium roots; common fine pores; strongly calcareous; moderately alkaline (pH 8.0); clear, smooth boundary; horizon 4 to 9 inches thick.

A12—9 to 18 inches, grayish-brown (10YR 5/2) gravelly sandy loam, dark brown (10YR 3/3) when moist; weak, fine and medium, granular structure; slightly hard, friable, nonsticky and nonplastic; few fine

roots; common fine pores; strongly calcareous; many filaments of lime; moderately alkaline (pH 8.0); clear, smooth boundary; horizon 7 to 10 inches thick.

AC—18 to 25 inches, grayish-brown (10YR 5/2) gravelly sandy loam, dark brown (10YR 3/3) when moist; weak, fine and medium, subangular blocky and fine and medium, granular structure; slightly hard, friable, nonsticky and nonplastic; few, medium and common, fine pores; strongly calcareous; many filaments of lime; moderately alkaline (pH 7.9); clear, smooth boundary; horizon 0 to 10 inches thick.

C1—25 to 33 inches, light grayish-brown (10YR 6/2) gravelly sandy loam, brown to dark brown (10YR 4/3) when moist; massive; slightly hard, friable, nonsticky and nonplastic; many fine pores; strongly calcareous; moderately alkaline (pH 8.1); gradual, wavy boundary; horizon 8 to 14 inches thick.

C2—33 to 61 inches, light grayish-brown (10YR 6/2) gravelly sandy loam, grayish brown (10YR 5/2) when moist; massive; soft, friable, nonsticky and nonplastic; many fine pores; strongly calcareous; moderately alkaline (pH 7.9).

Gravelly sandy loam is the only soil type mapped in the survey area. The content of gravel in the A horizons, by volume, ranges from 15 to 40 percent. When moist, this horizon ranges from very dark grayish brown to dark brown. It ranges from 1.5 to 3.5 percent in organic-matter content. The A horizons are moderately to strongly calcareous. Texture of the control section ranges from gravelly sandy loam to gravelly loam. Pebbles and cobbles make up from 20 to 50 percent of the C horizon, by volume.

MARTINI SERIES: The Martini series consists of deep, moderately coarse textured, highly stratified Alluvial soils that are calcareous and moderately well drained. These soils occur on nearly level flood plains. They formed in mixed alluvium that was derived primarily from quartzite, sandstone, limestone, and granite.

Profile of Martini fine sandy loam, 0 to 1 percent slopes, 300 feet south and 175 feet east of the north quarter corner of section 8, T. 6 N., R. 2 W.:

A11—0 to 5 inches, grayish-brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) when moist; weak, fine, granular structure; soft, very friable, nonsticky and nonplastic; abundant fine roots; few fine pores; moderately calcareous; mildly alkaline (pH 7.7); clear, smooth boundary; horizon 4 to 11 inches thick.

A12—5 to 15 inches, brown (10YR 5/3) fine sandy loam stratified with thin lenses of fine sand, dark brown (10YR 3/3) when moist; massive; soft, very friable, nonsticky and nonplastic; plentiful fine roots; few fine and large pores; moderately calcareous; mildly alkaline (pH 7.8); abrupt, wavy boundary; horizon 5 to 15 inches thick.

C1—15 to 19 inches, grayish-brown (10YR 5/2) fine sand, dark grayish brown (10YR 4/2) when moist; single grain; loose, nonsticky and nonplastic; few fine roots; few fine pores; moderately calcareous; moderately alkaline (pH 8.0); clear, wavy boundary; horizon 0 to 6 inches thick.

C2—19 to 70 inches, grayish-brown (10YR 5/2) fine sandy loam stratified with thin lenses of fine sand, dark grayish brown (10YR 4/2) when moist; massive; soft, very friable, nonsticky and nonplastic; few fine and medium roots; few fine and large pores; common, fine, faint mottles of yellowish brown (10YR 5/6); moderately calcareous; moderately alkaline (pH 7.9).

Fine sandy loam is the only soil type mapped in the survey area. When moist, the A1 horizons range from very dark grayish brown to dark brown. Their content of organic matter ranges from 1.5 to 6 percent. Texture of the control section is dominantly a fine sandy loam. Faint to distinct mottles occur between a depth of 32 and 40 inches. The depth to water table ranges from 40 inches to more than 60 inches. The pH values range from 7.5 to 8.6.

PAYSON SERIES: The Payson series consists of deep, medium-textured, somewhat poorly drained and moderately well drained Solonetz soils. These soils formed in mixed lake sediments on nearly level low lake terraces.

Profile of Payson silt loam, 860 feet east and 550 feet north of the south quarter corner of section 3, T. 1 N., R. 1 W.:

A21—0 to 2 inches, light-gray (2.5Y 6/2) silt loam, dark grayish brown (10YR 4/2) when moist; weak, thick, platy structure; slightly hard, friable, slightly plastic; few roots; many medium pores (vesicules); noncalcareous; neutral (pH 7.0); abrupt, smooth boundary; horizon 1 to 3 inches thick.

A22—2 to 4 inches, light grayish-brown (10YR 6/2) silt loam, dark grayish brown (10YR 3.5/2) when moist; moderate, thin, platy structure; hard, friable, nonsticky and slightly plastic; few roots; few medium pores; noncalcareous; neutral (pH 7.3); abrupt, wavy boundary; horizon ½ inch to 4 inches thick.

B2t—4 to 9 inches, light grayish-brown (10YR 6/2) silty clay loam, dark grayish brown (10YR 4/2) when moist; strong, medium and fine, columnar structure that breaks to moderate, medium, angular blocky structure; extremely hard, very firm, very sticky and very plastic; few fine roots between peds; few fine pores; peds coated with thick, continuous, very dark gray (10YR 3/1, moist or dry) clay films on vertical and horizontal surfaces; surface of peds noncalcareous, interior of peds weakly calcareous; moderately alkaline (pH 8.1); clear, wavy boundary; horizon 3 to 12 inches thick.

B3ca—9 to 24 inches, light-gray (2.5Y 7/2) clay, grayish brown (2.5Y 5/2) when moist; moderate, medium and coarse, prismatic structure that breaks to moderate, medium, subangular blocky structure; extremely hard, firm, very sticky and very plastic; few fine roots between peds; few fine pores; thin, patchy, dark grayish-brown (10YR 4/2, dry or moist) clay films on vertical ped surfaces and in pores; strongly calcareous; strongly alkaline (pH 8.9); clear, smooth boundary; horizon 12 to 20 inches thick.

C—24 to 30 inches +, pale-brown (5Y 7/3) silt loam, olive (5Y 5/3) when moist; weak, medium, platy structure; very hard, firm, very plastic and very sticky; few pores; strongly calcareous; very strongly alkaline (pH 9.1).

The texture of the surface layer ranges from heavy fine sandy loam to light silty clay loam. When moist, the A2 horizons range from dark grayish brown to gray or light brownish gray. In places, the A2 horizons have received lime from floodwaters that are high in carbonates. The B2t horizon is generally silty clay but ranges to heavy silty clay loam. It has strong, columnar structure and thick, continuous clay films. In the B3ca horizon, the clay films are generally thin and patchy. When moist, the B horizons range from very dark grayish brown to gray or light brownish gray in hues of 2.5Y and 10YR. Exchangeable sodium ranges from 15 to 35 percent in the B2t horizon and from 20 to 97 percent in the B3ca and C horizons. The water table is commonly at a depth of 40 to 60 inches.

PLEASANT VIEW SERIES: The Pleasant View series consists of deep, well-drained, gravelly, medium-textured and moderately coarse textured Alluvial soils. These

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soils occur on alluvial and colluvial fans deposited on lake terraces. The parent material is alluvium that was derived mainly from gneiss, schist, shale, and argillite.

Profile of Pleasant View loam, 6 to 10 percent slopes, 600 feet north and 100 feet east of the west quarter corner of section 19, T. 7 N., R. 1 W.:

Ap—0 to 4 inches, dark grayish-brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) when moist; weak, thick, platy structure; slightly hard, friable, slightly sticky and nonplastic; plentiful fine roots; common medium pores; mildly alkaline (pH 7/6); clear, smooth boundary; horizon 4 to 7 inches thick.

A12—4 to 25 inches, grayish-brown (10YR 5/2) gravelly loam, very dark grayish brown (10YR 3/2) when moist; weak, medium and coarse, subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; common fine pores; neutral (pH 7.2); clear, smooth boundary; horizon 15 to 24 inches thick.

A13—25 to 34 inches, brown (10YR 5/3) gravelly light loam, dark brown (10YR 3/3) when moist; weak, medium and coarse, subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few fine roots; common medium pores; slightly calcareous; mildly alkaline (pH 7.4); clear, smooth boundary; horizon 9 to 12 inches thick.

C1ca—34 to 45 inches, light brownish-gray (10YR 6/2) gravelly sandy loam, very dark grayish brown (10YR 3/2) when moist; massive; slightly hard, friable, nonsticky and nonplastic; common medium pores; moderately calcareous; moderately alkaline (pH 8.0); clear, smooth boundary; horizon 8 to 12 inches thick.

C2ca—45 to 56 inches, pale-brown (10YR 6/3) gravelly sandy loam, dark grayish brown (10YR 4/2) when moist; massive; slightly hard, friable, nonsticky and nonplastic; common medium pores; strongly calcareous; moderately alkaline (pH 8.0); clear, smooth boundary; horizon 0 to 13 inches thick.

C3—56 to 67 inches, light yellowish-brown (10YR 6/4) gravelly light sandy loam, yellowish brown (10YR 5/4) when moist; single grain; loose, nonsticky and nonplastic; strongly calcareous; moderately alkaline (pH 8.1).

Loam and gravelly sandy loam soil types are mapped in the survey area. The texture of the A1 horizon ranges from loam to heavy sandy loam and is 10 to 30 percent fine gravel, by volume. When moist, the A1 horizon ranges from very dark grayish brown to dark brown or very dark brown. The content of organic matter ranges from 1.5 to 4.5 percent. In places, the A horizons are slightly calcareous. Texture of the C horizons ranges from loam to heavy sandy loam. When moist, the C horizons range from dark brown to brown or yellowish brown. The content of fine gravel in the C horizons ranges from 15 to 35 percent.

REFUGE SERIES: The Refuge series consists of deep, moderately coarse textured and medium-textured, calcareous Solonchak soils that are somewhat poorly drained and highly stratified. These soils occur on low flood plains. They formed in mixed alluvium that was derived dominantly from limestone, sandstone, quartzite, and granite.

Profile of Refuge loam, about 1,750 feet west and 200 feet north of the center of section 19, T. 7 N., R. 2 W.:

A11—0 to 3 inches, grayish-brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) when moist; weak, thin, platy structure that breaks to fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; abundant fine roots; few fine pores; moderately calcareous; mildly alkaline (pH 7.6); clear, smooth boundary; horizon 2 to 5 inches thick.

A12—3 to 8 inches, brown (10YR 5/3) silt loam, dark brown (10YR 3/3, moist); weak, medium, angular blocky and weak, fine, granular structure; hard, friable, slightly sticky and slightly plastic; few fine roots; common fine pores; few, medium, distinct mottles of yellowish brown (10YR 5/6); moderately calcareous; strongly alkaline (pH 8.6); clear, smooth boundary; horizon 4 to 7 inches thick.

C1—8 to 21 inches, pale-brown (10YR 6/3) fine sandy loam, brown (10YR 4/3) when moist; massive; slightly hard, friable, nonsticky and slightly plastic; common fine pores; common, medium, distinct mottles of yellowish brown (10YR 5/6); moderately calcareous; strongly alkaline (pH 8.6); clear, smooth boundary; horizon 8 to 15 inches thick.

C2sa—21 to 47 inches, pale-brown (10YR 6/3) loam, brown to dark brown (10YR 4/3) when moist; massive; hard, friable, slightly sticky and slightly plastic; common fine pores; common, medium, faint mottles of dark yellowish brown (10YR 4/4); moderately calcareous; moderately alkaline (pH 8.3); clear, smooth boundary; horizon 22 to 34 inches thick.

C3—47 to 71 inches, pale-brown (10YR 6/3) fine sand, brown (10YR 5/3) when moist; massive; soft, very friable, nonsticky and nonplastic; few fine pores; common, medium, faint mottles of dark yellowish brown (10YR 4/4); moderately calcareous; moderately alkaline (pH 8.3).

The texture of the A1 horizons ranges from loam to fine sandy loam or silt loam. When moist, these horizons range from very dark grayish brown to dark brown. Their content of organic matter ranges from 2 to 5 percent. Texture of the control section ranges from fine sandy loam to light loam. Faint to distinct mottles occur within a depth of 20 inches. Horizons below a depth of 20 inches contain more than 2 percent soluble salt, which is mostly sodium chloride.

ROSHE SPRINGS SERIES: The Roshe Springs series consists of deep, medium-textured, poorly drained and very poorly drained Solonchak soils that are very strongly calcareous. These soils occur at the base of broad alluvial fans on low lake terraces in areas where the lake sediments have been modified by water high in calcium carbonate. Parent materials consist of medium-textured alluvium and lake sediments that were derived from many kinds of rocks, mainly limestone, quartzite, and gneiss.

Profile of Roshe Springs silt loam, 440 feet north and 1,500 feet west of the southeast corner of section 24, T. 7 N., R. 2 W.:

Ap—0 to 7 inches, gray (2.5Y 5/1) silt loam, very dark gray (2.5Y 3/1) when moist; weak, medium and fine, granular structure; hard, friable, slightly sticky and slightly plastic; abundant fine and medium roots; few medium pores; very strongly calcareous; mildly alkaline (pH 7.5); clear, smooth boundary; horizon 4 to 7 inches thick.

A12ca—7 to 12 inches, gray (2.5Y 5/1) loam, very dark gray (2.5Y 3/1) when moist; moderate, medium, subangular blocky structure; very hard, firm, slightly sticky and slightly plastic; plentiful fine and medium roots; common fine pores; very strongly calcareous; mildly alkaline (pH 7.5); clear, irregular boundary; horizon 4 to 10 inches thick.

C1cag—12 to 33 inches, gray (N 6/0) loam, gray (5Y 5/1) when moist; massive; hard, firm, slightly sticky and slightly plastic; plentiful fine roots; common, fine and medium pores; very strongly calcareous; mildly alkaline (pH 7.7); clear, smooth boundary; horizon 10 to 25 inches thick.

C2cag—33 to 52 inches, light-gray (N 6/0) loam, gray (5Y 5/1) when moist; massive; hard, very friable, nonsticky and nonplastic; few fine roots; few medium

and large pores; very strongly calcareous; weakly cemented; many fine nodules of lime; mildly alkaline (pH 7.8); clear, smooth boundary; horizon 16 to 24 inches thick.

C3g—52 to 80 inches, gray (5Y 6/1) sandy loam, dark gray (5Y 4/1) when moist; massive; slightly hard, friable, nonsticky and nonplastic; few medium roots; few fine pores; common, medium, prominent mottles of light olive brown (2.5Y 5/6); strongly calcareous; mildly alkaline (pH 7.8).

Silt loam is the only soil type mapped in the survey area. In places a layer of peat, 1 to 5 inches thick, occurs on the surface. When moist, the A1 horizon ranges from very dark gray to black. Its content of organic matter ranges from 4 to 20 percent. Texture of the control section is dominantly a heavy loam or silt loam, but it ranges to a light silty clay loam. The calcium carbonate equivalent ranges from 40 to 80 percent. These soils are gleyed or strongly mottled within a depth of 20 inches. The water table fluctuates between the surface and a depth of 36 inches.

STEED SERIES: The Steed series consists of sandy and gravelly, moderately coarse textured, highly stratified Alluvial soils that are calcareous and are well drained and moderately well drained. These soils occur on stream flood plains. They formed in alluvium that was derived primarily from quartzite, sandstone, limestone, and granite.

Profile of Steed fine sandy loam, 0 to 1 percent slopes, 1,000 feet south and 100 feet west of the center of section 18, T. 5 N., R. 1 W.:

A11—0 to 2 inches, grayish-brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) when moist; very weak, medium, platy structure that breaks easily to weak, fine, granular structure; soft, very friable, nonsticky and nonplastic; abundant fine and medium roots; few fine pores; moderately calcareous; mildly alkaline (pH 7.7); clear, smooth boundary; horizon 0 to 8 inches thick.

A12—2 to 9 inches, brown (10YR 5/3) fine sandy loam, dark brown (10YR 3/3) when moist; weak, medium and fine, granular structure; slightly hard, very friable, nonsticky and nonplastic; few fine roots; few fine pores; moderately calcareous; mildly alkaline (pH 7.8); clear, smooth boundary; horizon 6 to 9 inches thick.

C1—9 to 13 inches, pale-brown (10YR 6/3) loamy fine sand, brown (10YR 4/3) when moist; massive or single grain; soft, very friable, nonsticky and nonplastic; few fine roots; few fine pores; moderately calcareous; moderately alkaline (pH 8.0); abrupt, smooth boundary; horizon 0 to 7 inches thick.

C2—13 to 17 inches, pale-brown (10YR 6/3) gravelly loamy fine sand, brown (10YR 4/3) when moist; single grain; loose, very friable, nonsticky and nonplastic; few fine roots; slightly calcareous; moderately alkaline (pH 8.0); clear, wavy boundary; horizon 4 to 10 inches thick.

IIC3—17 inches +, pale-brown (10YR 6/3) very gravelly and cobbly coarse sand, brown (10YR 4/3) when moist; single grain; loose, nonsticky and nonplastic; few fine roots; slightly calcareous; moderately alkaline (pH 8.2).

Fine sandy loam and gravelly fine sandy loam soil types are mapped in the survey area. Texture of the A1 horizons ranges from loamy fine sand to light loam or gravelly loamy fine sand to gravelly light loam. When moist, the A1 horizons range from very dark grayish brown to dark brown. The content of organic matter in these horizons ranges from 1 to 3.5 percent. The texture of the control section is dominantly gravelly fine sandy loam or gravelly loamy fine sand. Faint to distinct mottles are common in some places.

STERLING SERIES: The Sterling series consists of very gravelly, cobbly, or very stony, medium-textured Calcisols that are somewhat excessively drained. These soils occur on colluvial-alluvial fans. They formed in alluvium that was derived dominantly from limestone, quartzite, gneiss, and schist.

Profile of Sterling cobbly loam, 8 to 20 percent slopes, 500 feet north and 900 feet east of the southwest corner of section 34, T. 7 N., R. 1 W.:

Ap—0 to 5 inches, grayish-brown (10YR 5/2) cobbly loam, very dark brown (10YR 2/2) when moist; weak, medium and thick, platy structure; slightly hard, friable, slightly sticky and slightly plastic; few fine and medium roots; few fine pores; small fragments of limestone; noncalcareous; mildly alkaline (pH 7.7); clear, smooth boundary; horizon 3 to 7 inches thick.

A12—5 to 16 inches, grayish-brown (10YR 5/2) cobbly loam, very dark brown (10YR 2/2) when moist; weak, medium, subangular blocky structure; hard, friable, slightly sticky and slightly plastic; plentiful fine and medium roots; common fine pores; small fragments of limestone; noncalcareous; mildly alkaline (pH 7.7); clear, smooth boundary; horizon 7 to 15 inches thick.

C1ca—16 to 22 inches, pale-brown (10YR 6/3) very cobbly loam, brown to dark brown (10YR 4/3) when moist; weak, moderately fine and medium, subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine roots; common fine pores; strongly calcareous; moderately alkaline (pH 7.9); clear, smooth boundary; horizon 5 to 10 inches thick.

C2ca—22 to 27 inches, pale-brown (10YR 6/3) very cobbly sandy loam, brown (10YR 5/3, moist); weak, medium and coarse, subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; few fine and medium pores; strongly calcareous; moderately alkaline (pH 8.1); clear, wavy boundary; horizon 0 to 8 inches thick.

C3—27 to 48 inches, pale-brown (10YR 6/3) very cobbly sandy loam, brown (10YR 5/3) when moist; massive; slightly hard, friable, slightly sticky and nonplastic; few fine roots; common fine pores; strongly calcareous; moderately alkaline (pH 8.1).

Gravelly loam, cobbly loam, and very rocky loam types are mapped in the survey area. When moist, the A1 horizons range from very dark brown to very dark grayish brown or dark brown. Their content of organic matter ranges from 2.5 to 4.5 percent. Texture of the control section is a very cobbly loam or a very stony loam. Coarse fragments make up 50 to 80 percent of the control section, by volume. The calcium carbonate equivalent of the Cca horizons ranges from 15 to 50 percent.

SUNSET SERIES: The Sunset series consists of deep, medium-textured, calcareous Alluvial soils that are moderately well drained and somewhat poorly drained. These soils occur on flood plains and low river terraces. They formed in alluvium that was derived mainly from quartzite, sandstone, limestone, and granite.

Profile of Sunset loam, 0 to 1 percent slopes, about 900 feet south of the center of section 6, T. 5 N., R. 1 W.:

Ap—0 to 7 inches, grayish-brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) when moist; fine and medium, granular and weak, medium, subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; plentiful fine roots; few fine pores; moderately calcareous; mildly alkaline (pH 7.6); abrupt, smooth boundary; horizon 6 to 8 inches thick.

A12—7 to 18 inches, grayish-brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) when moist; weak, medium, subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; plentiful fine roots; common, fine and few, medium pores; moderately calcareous; mildly alkaline (pH 7.8); clear, smooth boundary; horizon 2 to 16 inches thick.

AC—18 to 32 inches, pale-brown (10YR 6/3) loam, dark brown (10YR 3/3) when moist; weak, fine, subangular blocky and weak, medium, granular structure; soft, very friable, slightly sticky and slightly plastic; few fine roots; common fine and few medium pores; moderately calcareous; moderately alkaline (pH 7.9); clear, wavy boundary; horizon 8 to 18 inches thick.

C1—32 to 44 inches, pale-brown (10YR 6/3) loam, dark brown (10YR 3/3) when moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; common fine and few medium pores; common, fine, faint mottles of dark yellowish brown (10YR 4/4); moderately calcareous; mildly alkaline (pH 7.8); clear, wavy boundary; horizon 7 to 19 inches thick.

C2—44 to 68 inches, pale-brown (10YR 6/3) loam, dark brown (10YR 4/3) when moist; massive; slightly hard, very friable, nonsticky and nonplastic; few fine roots; common fine pores; common, medium, distinct mottles of strong yellowish brown (7.5YR 5/6); moderately calcareous; moderately alkaline (pH 7.9).

Loam is the only soil type mapped in the survey area. Texture of the A12 horizon ranges from loam to very fine sandy loam. When moist, the A1 horizon ranges from very dark grayish brown to dark brown. Its content of organic matter ranges from 2 to 4.5 percent. Sunset soils are generally highly stratified. Texture of the control section ranges mainly from loam to very fine sandy loam. These soils are underlain by sand and gravel at a depth of 20 inches or more in a few places. Faint to distinct mottles occur between a depth of 20 to 40 inches. The water table commonly occurs at a depth of 30 to 45 inches.

SYRACUSE SERIES: The Syracuse series consists of deep, coarse-textured, somewhat poorly drained Solonchak soils. These soils occur on low lake terraces. They formed in coarse-textured alluvium and lake sediments that were derived from many kinds of rocks, mainly quartzite, limestone, and gneiss.

Profile of Syracuse loamy fine sand near the northeast quarter corner of section 17, T. 4 N., R. 2 W.:

A1—0 to 11 inches, grayish-brown (10YR 5/2) loamy fine sand, very dark grayish brown (10YR 3/2) when moist; weak, fine, granular structure; soft, loose, nonsticky and nonplastic; plentiful fine roots; few fine pores; noncalcareous; moderately alkaline (pH 7.9); clear, smooth boundary; horizon 6 to 12 inches thick.

AC—11 to 21 inches, grayish-brown (10YR 5/2) sandy loam or loamy fine sand, dark grayish brown (10YR 4/2) when moist; weak, fine, subangular blocky structure that breaks to weak, fine, granular structure; soft, loose, nonsticky and nonplastic; plentiful fine roots; few fine pores; slightly calcareous; moderately alkaline (pH 8.0); clear, smooth boundary; horizon 10 to 18 inches thick.

C1ca—21 to 30 inches, light-gray (10YR 7/2) sandy loam, light brownish gray (10YR 6/2) when moist; massive; soft, loose, nonsticky and nonplastic; few fine roots; few fine pores; moderately calcareous; strongly alkaline (pH 8.9); clear, smooth boundary; horizon 8 to 14 inches thick.

C2ca—30 to 60 inches, white (10YR 8/2) sandy loam, light gray (10YR 7/2) when moist; massive; soft, loose, nonsticky and nonplastic; few fine roots; few fine pores; strongly calcareous; very strongly alkaline (pH 9.1).

Loamy fine sand is the only soil type mapped in the survey area. The content of organic matter in the A1 horizon ranges from 1 to 2 percent. Texture of the control section is dominantly loamy fine sand. Depth to the Cca horizon ranges from 16 to 30 inches, and the calcium carbonate equivalent in this horizon ranges from 15 to 30 percent. The water table commonly occurs at a depth of 24 to 36 inches. Mottles are generally within 40 inches of the surface. The effect of salts and alkali ranges from slight to strong.

TERMINAL SERIES: The Terminal series consists of somewhat poorly drained, medium-textured Solonetz soils that are moderately deep over a lime-cemented pan. These soils occur on nearly level low lake terraces. They formed in mixed medium-textured sediments that were derived from many kinds of rocks.

Profile of Terminal loam, about 700 feet southwest of the northeast corner of section 3, T. 1 N., R. 1 W.:

A11—0 to 4 inches, grayish-brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) when moist; weak, thin, platy structure; slightly hard, friable, slightly sticky and slightly plastic; plentiful fine roots; few, fine, tubular and many, fine, vesicular pores; slightly calcareous; mildly alkaline (pH 7.8); abrupt, smooth boundary; horizon 2 to 5 inches thick.

A12—4 to 10 inches, grayish-brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) when moist; moderate, medium, platy structure; hard, friable, slightly sticky and slightly plastic; many fine roots; few fine pores; slightly calcareous; neutral (pH 7.2); abrupt, smooth boundary; horizon 3 to 7 inches thick.

B2t—10 to 14 inches, light brownish-gray (10YR 6/2) sandy clay loam, dark grayish brown (10YR 4/2) when moist; strong, medium, columnar structure; very hard, friable, slightly sticky and plastic; few fine roots between peds; few fine pores; thick continuous clay films on peds; moderately calcareous; moderately alkaline (pH 8.0); abrupt, smooth boundary; horizon 4 to 18 inches thick.

C1g—14 to 22 inches, light-gray (2.5Y 7/2) sandy clay loam, grayish brown (2.5Y 5/2) when moist; strong, medium and thin, platy structure; hard, firm, sticky and plastic; few fine roots; few fine pores; strongly calcareous; moderately alkaline (pH 8.3); abrupt, smooth boundary; horizon 4 to 18 inches thick.

C2cam—22 to 24 inches, white (N 8/0) strongly cemented hardpan, light brownish gray (2.5Y 6/2) when moist; very strongly calcareous; strongly alkaline (pH 8.8); abrupt, wavy boundary; horizon 2 to 6 inches thick.

C3g—24 to 35 inches, white (5Y 8/2) silty clay loam, light olive gray (5Y 6/2) when moist; very hard, very firm, sticky and plastic; few fine pores; common, medium, distinct mottles of yellowish brown (10YR 5/4); strongly calcareous; strongly alkaline (pH 8.8); abrupt, smooth boundary; horizon 6 to 30 inches thick.

C4—35 to 72 inches, very pale brown (10YR 7/3) silty clay loam, brown (10YR 6/3) when moist; massive; very hard, very firm, sticky and plastic; few fine pores; very strongly calcareous; strongly alkaline (pH 8.7).

Loam is the only soil type mapped in the survey area. When moist, the A1 horizons range from very dark grayish brown to very dark gray. Their content of organic matter ranges from 1 to 3 percent. The B2t horizons have sandy clay loam or clay loam texture and moderate or strong prismatic structure; thin or thick continuous clay films are on ped surfaces. Depth to the hardpan ranges from 12 to 40 inches, and thickness of the hardpan ranges from 2 to 6 inches. The hardpan is strongly cemented to indurated.

TIMPANOGOS, NONCALCAREOUS VARIANT: Noncalcareous variants from the Timpanogos series consist of deep, well-drained, medium-textured Brunizems. These soils formed in alluvium that was derived dominantly from gneiss, schist, argillite, and quartzite and deposited on high lake terraces.

Profile of Timpanogos very fine sandy loam, noncalcareous variant, 10 to 20 percent slopes, 750 feet north and 700 feet east from the northwest corner of section 18, T. 7 N., R. 1 W.:

A1—0 to 7 inches, grayish-brown (10YR 5/2) very fine sandy loam, very dark grayish brown (10YR 3/2) when moist; weak, medium and fine, granular structure; slightly hard, friable, nonsticky and nonplastic; plentiful fine roots; few fine pores; neutral (pH 6.9); clear, smooth boundary; horizon 7 to 13 inches thick.

B1—7 to 12 inches, brown (10YR 5/3) very fine sandy loam, dark brown (10YR 3/3) when moist; moderate, medium and coarse, subangular blocky structure; hard, friable, nonsticky and slightly plastic; plentiful fine roots; few medium pores; slightly acid (pH 6.5); clear, smooth boundary; horizon 5 to 8 inches thick.

B21t—12 to 19 inches, yellowish-brown (10YR 5/4) heavy very fine sandy loam, dark yellowish brown (10YR 3/4) when moist; moderate, coarse, subangular blocky structure; very hard, firm, slightly sticky and slightly plastic; few fine roots; common medium pores; thin continuous clay films; neutral (pH 6.6); clear, smooth boundary; horizon 7 to 13 inches thick.

B22t—19 to 31 inches, light yellowish-brown (10YR 6/4) very fine sandy loam, dark yellowish brown (10YR 4/4) when moist; moderate, medium and coarse, subangular blocky structure; very hard, firm, slightly sticky and slightly plastic; few very fine roots; common medium pores; thin continuous clay films; slightly acid (pH 6.5); clear, smooth boundary; horizon 9 to 12 inches thick.

B3—31 to 48 inches, light yellowish-brown (10YR 6/4) light loam, dark yellowish brown (10YR 4/4) when moist; weak, medium, subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few fine roots; many medium pores; thin patchy clay films; few, fine, faint mottles of yellowish brown (10YR 5/6); slightly acid (pH 6.5); gradual, smooth boundary; horizon 10 to 18 inches thick.

C—48 to 73 inches, light yellowish-brown (10YR 6/4) very fine sandy loam, dark yellowish brown (10YR 4/4) when moist; massive; soft, friable, nonsticky and nonplastic; common fine pores; common, fine, faint mottles of yellowish brown (10YR 5/8); neutral (pH 6.8).

Very fine sandy loam is the only soil type mapped in the survey area. When moist, the A1 horizon ranges from very dark grayish brown to dark brown. Its organic-matter content ranges from 1.5 to 3 percent. The B2t horizons have weak to moderate, subangular blocky structure and thin, patchy to continuous clay films on ped surfaces. Texture of these horizons ranges from very fine sandy loam to light very fine sandy clay loam. When moist, the B2t horizons range from dark yellowish brown to dark brown in hues of 7.5YR or 10YR.

TRENTON SERIES: The Trenton series consists of deep, medium-textured, moderately well drained and somewhat poorly drained, calcareous Solonetz soils. These soils occur on nearly level to strongly sloping lake terraces. They formed in medium-textured lake sediments that were derived from many kinds of rocks.

Profile of Trenton silt loam, 1 to 3 percent slopes, eroded, 500 feet south and 100 feet west of the northeast corner of section 17, T. 4 N., R. 1 W.:

A1—0 to 4 inches, dark grayish-brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) when moist; very weak, medium, platy structure that breaks easily to weak, fine, granular structure; slightly hard, friable, slightly sticky and slightly plastic; abundant fine roots; few fine pores; noncalcareous; neutral (pH 7.3); abrupt, smooth boundary; horizon 4 to 10 inches thick.

B21t—4 to 7 inches, brown (7.5YR 5/2) clay loam, dark brown (7.5YR 3/2) when moist; moderate, medium, prismatic structure that breaks to fine, angular blocky structure; very hard, firm, sticky and very plastic; patches of dark organic stains on vertical faces of peds; thin patchy clay films, mainly in channels; abundant fine pores; few fine roots; noncalcareous; mildly alkaline (pH 7.5); clear, smooth boundary; horizon 2 to 6 inches thick.

B22t—7 to 13 inches, brown (7.5YR 5/4) silty clay, dark brown (7.5YR 3/4) when moist; moderate, medium, prismatic structure; extremely hard, very firm, sticky and very plastic; plentiful fine roots in cleavage planes; few fine pores; thin nearly continuous clay films; noncalcareous; mildly alkaline (pH 7.7); clear, smooth boundary; horizon 5 to 10 inches thick.

B3ca—13 to 33 inches, pink (7.5YR 7/4) silty clay loam, brown (7.5YR 5/4) when moist; weak, medium, prismatic structure that breaks to weak, medium, subangular blocky structure; hard, friable, slightly sticky and plastic; thin patchy clay films on ped surfaces and in pores; few fine roots along cleavage planes; few fine pores; strongly calcareous; white splotches of lime; moderately alkaline (pH 8.4); clear, smooth boundary; horizon 15 to 22 inches thick.

C—33 to 60 inches, pink (7.5YR 7/4) stratified silty clay loam and silt loam, brown (7.5YR 5/4) when moist; massive; very hard, firm, sticky and plastic; few fine roots; few fine pores; moderately calcareous; strongly alkaline (pH 8.8).

Silt loam is the only soil type mapped in the survey area. When moist, the A1 horizon ranges from very dark brown to very dark grayish brown. Its content of organic matter ranges from 1.5 to 3 percent. The B2t horizons have moderate to strong prismatic structure and range from clay loam to clay in texture. The peds in these horizons have thin patchy to continuous clay films on their surfaces. When moist, the B2t horizons range from dark brown to brown or very dark grayish brown in hues of 7.5YR and 10YR. Exchangeable sodium in the B2t horizons ranges from 15 to 50 percent. The water table generally is below a depth of 30 inches, and mottles also occur below that depth.

WAYMENT SERIES: The Wayment series consists of deep, moderately fine textured, calcareous Solonchak soils that are poorly drained and have a strong concentration of soluble salts within a depth of 20 inches. These soils occur on low flood plains. They formed in mixed alluvium that was derived dominantly from limestone, quartzite, shale, and sandstone.

Profile of Wayment silty clay loam, one-fourth mile west and 200 feet south of the northeast corner of section 25, T. 7 N., R. 3 W.:

A1sa—0 to 3 inches, grayish-brown (10YR 5/2) silty clay loam, very dark grayish brown (10YR 3/2) when moist; massive; hard, firm, slightly sticky and plastic; no roots; common fine pores; few, fine, faint mottles of dark yellowish brown (10YR 3/4); moderately calcareous; mildly alkaline (pH 7.8); clear, smooth boundary; horizon 0 to 5 inches thick.

ACsa—3 to 9 inches, light brownish-gray (10YR 6/2) silty clay loam, dark grayish brown (10YR 4/2) when moist; massive; hard, firm, slightly sticky and plastic; common fine pores; few, fine, faint mottles of dark yellowish brown (10YR 3/4); moderately calcareous; moderately alkaline (pH 7.9); clear, smooth boundary; horizon 0 to 8 inches thick.

C1sa—9 to 24 inches, light brownish-gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) when moist; massive; hard, firm, slightly sticky and plastic; common fine pores; common, fine, faint mottles of dark yellowish brown (10YR 4/4); moderately calcareous; moderately alkaline (pH 8.0); clear, smooth boundary; horizon 8 to 15 inches thick.

C2sa—24 to 46 inches, very pale brown (10YR 7/3) silty clay loam, brown (10YR 4/3) when moist; massive; very hard, firm, sticky and plastic; few fine pores; common, fine, faint mottles of dark yellowish brown (10YR 4/4); moderately calcareous; moderately alkaline (pH 8.0); clear, smooth boundary; horizon 18 to 32 inches thick.

C3sa—46 to 63 inches, very pale brown (10YR 7/3) loam, brown (10YR 5/3) when moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine pores; common, fine, faint mottles of dark yellowish brown (10YR 4/4); moderately calcareous; moderately alkaline (pH 8.0).

Silty clay loam is the only soil type mapped in the survey area. When moist, the upper horizons range from very dark grayish brown to dark grayish brown. In places, the surface is crusted with a salt that is mostly sodium chloride. Texture of the control section ranges from silt loam to silty clay loam. The Wayment soils are slightly to moderately calcareous, and their exchangeable sodium ranges from 30 to 80 percent. Above 20 inches these soils contain more than 2 percent soluble salts. Faint to distinct mottles occur throughout the profile, and the water table is at or near the surface most of the time.

Laboratory Analyses

The results of laboratory analyses of samples taken, by horizons, from selected soil profiles are shown in table 11. The analyses were made by the Soil Conservation Service and Utah State University Cooperative Soils Laboratory, Logan, Utah.

Methods of Analyses

All samples were air dried in the laboratory. Then they were sieved by hand using sieves 8 inches in diameter with round openings 2 millimeters in diameter. Samples that appeared to have no appreciable amount of pebbles or stones, less than 5 percent, were poured through a mechanical crusher that has openings of about 4 millimeters. Samples that had appreciable amounts of pebbles or stones were broken up in an iron mortar without crushing the pebbles or stones. If it were necessary to reduce the size of the sample, a Riffle sampler was used. Each laboratory sample was mixed thoroughly to insure uniformity, and all subsequent analyses were made on the fraction of less than 2 millimeters in diameter. The percentage of material greater than 2 millimeters in diameter was calculated by dividing the weight of the fraction retained on the 2-millimeter sieve by the initial weight of the air-dry sample. Using a porcelain mortar and pestle, the subsamples less than 2 millimeters in diameter were ground small enough to pass a sieve of 0.3 millimeter. These subsamples were used to determine the organic carbon and calcium carbonate equivalent.

TABLE 11.—*Physical and chemical*

[Analyses made at Utah State University, Logan, Utah.

Soil	Depth	Horizon	Size class and diameter of particles							
			Total			Sand fraction				
			Sand (2–0.05 mm.)	Silt (0.05–0.002 mm.)	Clay (<0.002 mm.)	Very coarse sand (2–1 mm.)	Coarse sand (1–0.5 mm.)	Medium sand (0.5–0.25 mm.)	Fine sand (0.25–0.1 mm.)	Very fine sand (0.1–0.05 mm.)
	Inches	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Ackmen loam.[1]	0–6	Ap	50	32	18					
	6–32	A12	50	31	19					
	32–60	C1	52	32	16					
Airport silty clay loam.	0–6	A1	11	56	33	0	0	0	2	9
	6–19	B2tca	9	53	38	0	0	0	1	8
	19–32	B3cag	19	46	35	0	0	0	3	16
	32–40	C1g	25	44	31	0	0	0	1	15
	40–60	C2g	3	61	36	0	0	0	1	2
Arave silt loam.	0–8	A1	33	56	11	0	0	4	12	17
	8–12	B1ca	31	48	21	1	2	4	11	13
	12–18	B2ca	42	28	30	3	4	4	12	19
	18–36	C1	33	43	24	0	1	5	18	9
	36–42	C2	21	58	21	0	0	2	10	9
	42–60	C3	9	69	22	0	0	0	1	8

See footnote at end of table.

The official pipette method of analysis was used to determine particle-size distribution. Organic matter was destroyed by using hydrogen peroxide, but lime was not removed, except where specifically stated in the survey. Sodium hexametaphosphate was used as a dispersing agent. The sand fractions were determined by mechanical sieving through a series of sieves 2 inches in diameter. Except for glassware, all equipment used in making the analyses was furnished by the Soil Survey Laboratory at Beltsville, Md. The pipette method of analysis was used on the materials less than 2 millimeters in diameter. The amount of material larger than 2 millimeters is expressed on the basis of the total weight of the air-dry sample; the amount of sand, silt, and clay is expressed on the basis of the ovendry materials.

The wet oxidation method using chromic acid was used to determine the organic carbon. Samples were heated during the oxidation process as described in the U.S. Department of Agriculture Handbook No. 60 (*17*). Silver sulfate was added to the sulfuric acid to prevent oxidation of chlorides for samples where soluble salts were 0.1 percent or more. After oxidation and dilution, an excess of ferrous ammonium sulfate was added to the sample, and the sample was then titrated with standard potassium permanganate. The permanganate also acted as an indicator, and a special titration light was used to help determine the exact endpoint.

The macro-Keldahl method was used to determine total nitrogen, with selinium as a catalyst. Enough water (about 15 to 20 milliliters) was added to the soil and other material in the flask to thoroughly wet the material before adding the acid for distillation. The distilled ammonia was caught in a 2 percent boric acid solution containing a special mixed indicator of bromcresol green and new coccine. The ammonia was then titrated with standard solution (1/14 N) of sulfuric acid, and the total amount of nitrogen was determined.

To determine the calcium carbonate equivalent, the technician allowed variable weights of the sample to react in constant glass containers with 2 N hydrochloric acid. The percentage of calcium carbonate equivalent was determined by referring manometer readings to a curve prepared from standard samples of calcium carbonate.

The moisture percentage of 15 atmospheres was determined by using the pressure membrane apparatus. Soil samples were placed in retaining rings 1 centimeter in depth and allowed to absorb water for at least 16 hours. Then, they were brought to equilibrium at the 15-atmosphere differential. Moisture is expressed as a percentage of the ovendry sample.

The reaction, or pH, was measured with a line-operated pH meter using a glass electrode with a calomel reference electrode. In determining the pH of soil-water suspensions in the ratio of one to five, the suspensions were stirred vigorously immediately before the electrodes were inserted. At the first indication of stabilization, the pH was read; then, the process was repeated until duplicate readings were obtained. Distilled water, or water free of carbon dioxide, was used for all soil-water suspensions.

In determining the cation-exchange capacity, samples of soil material less than 2 millimeters in diameter were saturated with sodium by four consecutive washings and centrifugations using 1 N sodium acetate solution that had been adjusted to pH 8.2. The soluble sodium acetate was removed by washing with a 95 percent solution of ethanol. The exchangeable sodium was then removed

properties of selected soils

Absence of data indicates values not determined]

Coarse fragments (larger than 2 mm.)	Organic carbon	Total nitrogen	Calcium carbonate equivalent	Water content at 15 atmospheres	Reaction (pH)		Cation-exchange capacity	Extractable bases (meq. per 100 gm. of soil)		Soluble salt (Bureau cup)	Electrical conductivity (millimhos per cm. at 25° C.)
					Saturated paste	1:5 H_2O		Na	K		
Percent	*Percent*	*Percent*	*Percent*	*Percent*			*Meq./100 gm. of soil*			*Percent*	
	2. 1		1		7. 3	7. 8	20. 2			0. 15	
	1. 5		1		7. 2	7. 8	22. 0			<. 02	
	. 5		1		7. 4	7. 8	14. 5			<. 02	
	2. 9		33		8. 1	9. 7				. 1	
	2. 1		38		8. 5	9. 7				. 1	
			50		8. 8	9. 6				. 1	
			34		8. 8	9. 9				. 1	
			25		8. 5	9. 2				. 1	
	1. 4	. 12	2	7. 0	8. 6	9. 5	13. 4	3. 1	4. 3	. 2	5. 4
	. 4	. 05	30	9. 6	8. 7	9. 8	11. 2	3. 6	4. 0	. 3	6. 0
	. 3	. 04	26	13. 7	8. 9	10. 1	14. 5	5. 0	4. 3	. 2	4. 9
	. 1	. 02	21	12. 5	9. 1	10. 1	13. 6	4. 2	3. 7	. 2	3. 5
	. 1	. 02	19	11. 8	8. 9	9. 9	13. 7	4. 6	4. 0	. 2	3. 5
	. 1	. 02	18	11. 8	8. 8	9. 8	13. 7	5. 4	4. 0	. 2	3. 6

TABLE 11.—*Physical and chemical*

Soil	Depth	Horizon	Size class and diameter of particles							
			Total			Sand fraction				
			Sand (2–0.05 mm.)	Silt (0.05–0.002 mm.)	Clay (<0.002 mm.)	Very coarse sand (2–1 mm.)	Coarse sand (1–0.5 mm.)	Medium sand (0.5–0.25 mm.)	Fine sand (0.25–0.1 mm.)	Very fine sand (0.1–0.05 mm.)
	Inches	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Barton gravelly loam.[1]	0–5	A11	42	45	13	4	10	7	11	10
	5–13	A12	37	46	17	2	8	6	10	11
	13–19	B2t	39	42	19	3	8	6	11	11
	19–31	C1	53	32	15	4	10	9	18	12
	31–35	C2								
Chance loam.	0–3	A11	13	58	29	2	3	1	4	3
	3–8	A12	8	60	32	0	0	1	2	5
	8–19	AC	22	53	25	0	3	4	8	7
	19–41	C1g	80	18	2	0	8	13	37	22
	41–57	C2g	78	19	3	0	4	9	38	27
	57–72	C3g	62	32	6	1	8	8	22	23
Croy loam.	0–4	A2	38	47	15	0	6	13	12	7
	4–10	B21t	38	41	21	0	5	14	13	6
	10–18	B22t	56	25	19	0	7	22	21	6
	18–24	C1	73	18	9	0	9	21	28	15
	24–32	C2	87	9	4	0	11	34	35	7
	32–35	C3m (Hardpan)								
Draper loam.[1]	0–8	Ap	39	37	24					
	8–21	A12	32	40	28					
	21–30	A13	38	35	27					
	30–53	C1	48	30	22					
Ford loam.[1]	0–9	A1	54	26	20					
	9–16	C1ca	50	30	20					
	16–34	C2ca	70	15	15					
	34–44	C3cam (Hardpan)	70	14	16					
	44–52	C4ca	77	8	15					
	52–60	C5cam (Hardpan)								
Francis loamy fine sand.	0–7	Ap	80	12	8	0	6	21	48	5
	7–13	A12	81	11	8	0	5	22	49	5
	13–23	C1	85	8	7	0	4	20	57	4
	23–46	C2	89	7	4	0	4	20	61	4
	46–73	C3	91	5	4	0	5	21	59	6
Harrisville silt loam.	0–8	Ap	10	65	25	0	0	0	4	6
	8–14	B21t	9	60	31	0	0	0	4	5
	14–22	B22tca	5	61	34	0	0	0	2	3
	22–33	B3ca	4	64	32	0	0	0	1	3
	33–45	C1	5	66	29	0	0	0	1	4
	45–60	C2	4	64	32	0	0	0	1	3
Hillfield silt loam.	0–6	Ap	42	52	6	0	1	1	2	38
	6–12	C1ca	32	57	11	0	0	1	2	29
	12–21	C2	35	55	10	0	0	0	3	32
	21–60	C3	61	37	2	0	0	0	11	50
Ironton silt loam.	0–6	A11	30	50	20	2	5	4	8	11
	6–16	A12	30	53	17	1	4	4	8	13
	16–21	A13ca	33	46	21	0	2	3	9	19
	21–36	C1ca	41	46	13	2	8	6	10	15
	36–48	C2ca	26	54	20	2	5	4	5	10
	48–63	C3	22	51	27	1	4	3	4	10

See footnote at end of table.

properties of selected soils—Continued

Coarse fragments (larger than 2 mm.)	Organic carbon	Total nitrogen	Calcium carbonate equivalent	Water content at 15 atmospheres	Reaction (pH)		Cation-exchange capacity	Extractable bases (meq. per 100 gm. of soil)		Soluble salt (Bureau cup)	Electrical conductivity (millimhos per cm. at 25° C.)
					Saturated paste	1:5 H_2O		Na	K		
Percent	*Percent*	*Percent*	*Percent*	*Percent*			*Meq./100 gm. of soil*			*Percent*	
17	1.5	0.12	----------	7.2	----------	----------	13.5	0.4	1.3	----------	1.2
25	1.1	.10	----------	8.4	----------	----------	15.4	.5	1.3	0.1	1.0
19	1.0	.09	----------	9.0	----------	----------	15.6	.5	1.2	.1	1.5
42	.6	.07	----------	7.3	----------	----------	11.5	.5	.6	.1	.6
----------	11.6	.91	10	35.5	7.5	8.7	59.0	5.3	.6	.2	4.2
----------	3.5	.32	(2)	20.4	7.4	8.6	37.1	2.6	.6	.1	1.9
----------	.5	.06	(2)	16.7	7.3	8.3	30.1	2.1	.6	.1	1.0
----------	.1	--------	0	2.6	7.9	9.0	5.4	.6	.3	<.03	.9
----------	.1	--------	4	2.3	8.0	9.2	4.4	.5	.3	<.03	.6
----------	.3	--------	4	3.6	8.0	8.8	7.0	.7	.4	.03	1.1
----------	3.1	.20	6	10.7	8.0	9.0	18.6	.6	.3	.03	1.0
----------	1.0	.19	12	10.2	8.8	9.8	15.6	2.8	7.1	.1	1.6
----------	.8	.06	12	10.2	9.4	10.1	13.0	4.7	6.0	.1	2.6
----------	.7	.06	6	----------	9.5	10.1	12.9	5.3	----------	.1	3.5
----------	.5	.04	9	6.6	9.5	9.7	8.5	2.3	1.7	.1	2.6
----------	3.3	--------	(2)	----------	7.4	7.9	----------	----------	----------	.1	----------
----------	3.2	--------	1	----------	7.4	7.9	----------	----------	----------	.1	----------
----------	1.4	--------	1	----------	7.3	7.9	----------	----------	----------	.1	----------
----------	.7	--------	2	----------	7.5	8.2	----------	----------	----------	.1	----------
----------	1.4	--------	11	----------	9.9	10.4	----------	----------	----------	.6	----------
----------	.6	--------	18	----------	9.4	10.1	----------	----------	----------	.1	----------
----------	----------	--------	15	----------	9.1	9.8	----------	----------	----------	.1	----------
----------	----------	--------	17	----------	8.8	9.5	----------	----------	----------	.1	----------
----------	----------	--------	17	----------	9.2	9.9	----------	----------	----------	.1	----------
----------	.7	.05	----------	3.8	7.8	8.4	7.5	.4	.4	<.02	.5
----------	.5	.04	----------	3.5	7.7	8.5	6.5	.3	.3	<.02	.5
----------	.2	.02	----------	2.8	7.9	8.3	5.4	.3	.3	<.02	.4
----------	.1	--------	----------	2.2	7.8	8.4	3.8	.3	.3	<.02	.6
----------	.4	--------	----------	1.6	7.9	8.2	2.5	.3	.2	<.02	.4
----------	1.7	.16	3	11.8	8.0	9.0	21.2	.9	1.5	.1	1.1
----------	.9	.11	8	13.7	8.8	9.7	18.8	2.9	1.2	.1	1.8
----------	.3	--------	23	15.1	9.0	10.6	13.4	7.4	1.0	.2	3.0
----------	.3	--------	19	16.6	9.0	10.4	15.4	9.0	.9	.2	3.0
----------	.2	--------	16	15.6	9.2	10.3	16.7	6.1	.9	.2	1.6
----------	.1	--------	16	15.4	9.0	--------	18.4	3.7	.9	.1	1.2
----------	.7	.06	17	8.6	7.7	8.9	12.6	.4	.5	.12	.7
----------	.4	.04	21	8.2	7.7	9.0	11.6	.4	.5	.04	.5
----------	.3	.04	18	7.1	7.9	9.0	5.8	.4	.4	.04	.5
----------	.1	--------	14	5.6	8.1	9.2	5.1	.5	.5	.03	.5
----------	3.2	.28	21	17.1	8.3	9.4	25.6	3.6	2.1	.2	3.8
----------	2.3	.20	28	16.0	8.0	8.9	21.2	1.1	1.1	.1	1.5
----------	1.3	.11	38	15.2	8.0	8.8	14.6	.8	.6	.1	1.0
----------	.3	--------	41	10.5	8.1	9.2	9.8	.4	.6	.04	.6
----------	.2	--------	36	12.2	7.9	9.2	10.7	.5	.7	.1	.6
----------	.2	--------	31	12.1	7.9	9.1	10.5	.3	.7	.1	.5

TABLE 11.—*Physical and chemical*

Soil	Depth	Horizon	Size class and diameter of particles							
			Total			Sand fraction				
			Sand (2–0.05 mm.)	Silt (0.05–0.002 mm.)	Clay (<0.002 mm.)	Very coarse sand (2–1 mm.)	Coarse sand (1–0.5 mm.)	Medium sand (0.5–0.25 mm.)	Fine sand (0.25–0.1 mm.)	Very fine sand (0.1–0.05 mm.)
	Inches	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Kidman fine sandy loam.	0–11	Ap	60	27	13	0	1	3	21	36
	11–17	A12	59	27	14	0	1	3	18	37
	17–21	B21	58	26	16	0	0	3	18	37
	21–27	B22	56	28	16	0	1	2	14	39
	27–37	C1ca	49	39	12	0	0	1	7	41
	37–49	C2ca	53	34	13	0	1	1	9	42
	49–58	C3ca	57	33	10	0	0	1	11	45
Kirkham silty clay loam.	0–7	Ap	4	57	39	0	0	0	2	2
	7–13	A12	3	55	42	0	0	0	2	1
	13–18	C1	4	65	31	0	0	0	3	1
	18–34	C1	1	60	39	0	0	0	0	1
	34–52	C2	33	51	16	0	0	0	5	28
	52–68	C3	53	35	12	0	0	0	34	19
Lakeshore silt loam.	0–4	A1sa	28	54	18	0	0	0	5	23
	4–8	C1sa	35	55	10	0	1	1	4	29
	8–13	C2sa	52	41	7	0	0	0	9	43
	13–19	C3sa	43	49	8	0	0	0	5	38
	19–41	C4sa	32	56	12	0	0	0	3	29
	41–51	C4sa	32	56	12	0	0	0	8	24
	51–64	C5g	22	65	13	0	0	0	2	20
Layton loamy fine sand.	0–7	Ap	78	17	5	0	1	14	58	5
	7–15	A12	77	17	6	0	1	13	59	4
	15–23	C1	76	17	7	0	2	11	59	4
	23–29	C2	78	17	5	0	1	9	65	3
	29–41	C3ca	82	14	4	0	2	12	64	4
	41–66	C4ca	91	9	0	0	3	29	56	3
Leland silt loam.	0–8	A2	34	57	9	0	0	1	0	24
	8–14	B2ca	34	34	32	1	1	1	10	21
	14–19	B3ca	64	17	18	0	0	1	34	29
	19–31	C1	78	17	5	0	1	0	18	59
	31–38	C2	29	54	17	0	0	0	5	24
	38–58	C3	51	43	6	0	0	0	7	44
Marriott gravelly sandy loam.	0–2	A11	66	27	7	1	5	8	27	25
	2–7	A12	69	21	10	1	5	9	30	24
	7–11	B21	69	21	10	1	5	9	31	23
	11–22	B22	70	20	10	2	5	8	31	24
	22–38	C1ca	69	21	10	1	4	7	32	25
	38–61	C1ca	70	20	10	2	4	9	31	24
Marriott gravelly sandy loam, calcareous variant.	0–9	Ap	72	20	8	21	19	10	15	7
	9–18	A12	70	19	11	18	20	10	16	6
	18–25	AC	69	21	10	20	18	10	15	6
	25–33	C1	67	23	10	17	16	10	17	7
	33–49	C2	73	20	7	16	16	10	21	10
	49–61	C2	76	19	5	14	16	11	24	11
Martini fine sandy loam.	0–5	A1	61	30	9	0	0	2	40	19
	5–15	A12	72	20	8	0	0	4	56	12
	15–19	C1	89	6	5	0	0	9	72	8
	19–45	C2	64	26	10	0	0	1	38	25
	45–70	C2	74	17	9	0	0	1	55	18
Parleys loam.	0–6	Ap	41	41	18	2	1	2	19	17
	6–15	A12	40	35	25	2	1	2	18	17
	15–26	B2t	28	37	35	1	1	1	11	14
	26–33	B3ca	14	54	32	0	0	1	2	11
	33–48	C1ca	17	57	26	0	1	3	4	9
	48–60	C2	18	54	28	0	0	2	2	14

See footnotes at end of table.

properties of selected soils—Continued

Coarse fragments (larger than 2 mm.)	Organic carbon	Total nitrogen	Calcium carbonate equivalent	Water content at 15 atmospheres	Reaction (pH)		Cation-exchange capacity	Extractable bases (meq. per 100 gm. of soil)		Soluble salt (Bureau cup)	Electrical conductivity (millimhos per cm. at 25° C.)
					Saturated paste	1:5 H_2O		Na	K		
Percent	*Percent*	*Percent*	*Percent*	*Percent*			*Meq./100 gm. of soil*			*Percent*	
	1.2	0.1		6.4	7.5	8.3	11.4	0.1	0.5	0.04	0.7
	.7	.1		6.4	7.3	8.2	11.2	.1	.5	.03	.7
	.8	.1		6.9	7.3	8.1	10.9	.1	.5	.03	.5
	.4			7.0	7.3	8.2	11.0	.1	.5	.03	.5
	.2		16	5.3	7.9	9.2	7.5	.1	.3	.04	.8
	.2		20	5.7	7.8	9.2	7.3	.1	.4	.04	.9
	.1		25	4.4	7.8	9.3	6.3	.1	.2	.04	.7
	2.0	.17	11	17.0	7.6	8.7	29.5	.7	1.2	.1	2.8
	1.6	.12	14	18.9	7.7	9.0	29.9	2.8	.8	.1	2.3
	.9	.07	16	15.3	8.0	9.7	23.2	5.4	.5	.2	3.9
	1.2		13	18.2	8.1	9.7	28.1	10.2	.5	.3	4.0
	.4		14	7.6	8.2	9.9	11.9	2.7	.3	.1	1.3
	.3		12	5.7	8.3	9.9	10.0	2.1	.3	.1	2.0
	.4	.04	16	9.8	8.1	9.1	10.9	10.8	1.0	2.2	55
	.3	.02	19	7.4	8.0	9.1	10.3	14.5	1.0	1.9	73
	.2	.01	10		8.1	9.1	8.9	6.2	1.2	1.9	88
	.3	.01	11	6.6	7.7	9.1	10.1	8.9	1.5	1.9	87
	.3	.02	11	7.7	7.7	9.1	11.2	1.5	1.6	1.9	72
			10	7.9	7.6	9.2	11.5	7.5	1.6	1.9	72
			13	8.2	7.0	8.3	12.0	11.9	1.7	1.9	72
	.7	.06		3.7	7.4	7.8	8.8	.3	.5	.02	.8
	.5	.05		4.0	7.4	7.9	4.0	.4	.6	.03	1.0
	.2	.03	0	4.5	7.9	8.7	2.5	.4	.5	.02	.9
	.2		2	4.0	8.1	8.9	5.5	.3	.4	<.02	.7
	.1		10	3.3	8.1	9.2	3.5	.4	.3	<.02	1.0
	.1		8	1.7	8.8	9.6	9.3	.4	.3	<.02	.7
	.4	.04	1	7.6	8.3	9.2	12.2	2.9	2.7	.1	2.3
	.4	.04	21	18.5	9.3	10.5	20.2	15.5	3.9	.2	4.7
	.1	.02	18	13.0	9.7	9.9	14.0	12.0	1.6	.4	7.8
	.1	.01	13	4.5	10.1	10.1	6.6	6.5	.8	.5	10.4
	.1	.02	16	10.8	9.8	10.1	13.1	11.9	1.6	.5	11.7
	.1	.01	14	4.9	9.8	10.0	8.0	7.1	0	.6	16.6
20	1.5	.12		5.5	7.4	8.4	2.7	.2	.8	.04	1.4
21	.6	.06		5.4	7.6	8.5	2.5	.2	.7	.03	.9
17	.4	.04		4.8	7.4	8.7	2.3	.2	.7	.03	.7
18	.3	.04	4	4.5	7.6	8.9	2.1	.2	.5	.02	.5
18	.2	.03	7	4.8	7.7	9.0	1.8	.2	.4	.02	.7
28	.1	.03	7	4.0	7.6	8.9	1.7	.2	.4	.02	.6
15	.9	.08	19	4.8	8.0	8.8	9.2	.3	.4	.02	.5
	.8	.08	25	5.5	8.0	8.7	9.1	.3	.3	.02	.5
10	.5	.06	23	5.3	7.9	8.7	7.8	.3	.3	.02	.5
	.4		26	5.0	8.1	9.0	6.7	.8	.3	.02	.4
12	.3		27	3.5	7.9	9.1	4.4	.3	.3	.02	.4
10	.2		22	2.8	8.2	9.3	3.4	.4	.3	.02	.3
	1.8	.15	7	8.3	7.7	8.6	13.2	.1	.7	.04	1.8
	.6	.04	7	3.9	7.8	8.6	6.8	.3	.4	.02	.8
	.1	.01	4	2.1	8.0	8.9	3.4	.3	.3	.02	.5
	.6		11	4.6	7.9	8.7	7.8	.4	.3	.03	.6
	.5		6	3.9	7.9	8.7	6.8	.3	.3	.03	.9
	2.9	.22	(2)	8.1	7.2	8.0	21.3	.2	2.3	.04	.5
	1.3	.12	(2)	10.1	7.1	7.8	20.9	.2	2.5	.04	.7
	.5	.07	(2)	13.2	7.3	8.0	23.7	.2	4.1	.1	.5
	.5	.07	23	11.3	8.0	9.1	18.0	.4	5.0	.1	1.1
	.3	.04	35	9.2	8.0	9.5	14.5	.4	5.4	.1	2.0
	.1	.02	24	10.0	8.0	9.0	14.7	.4	2.9	.1	1.3

TABLE 11.—*Physical and chemical*

Soil	Depth	Horizon	Size class and diameter of particles							
			Total			Sand fraction				
			Sand (2–0.05 mm.)	Silt (0.05–0.002 mm.)	Clay (<0.002 mm.)	Very coarse sand (2–1 mm.)	Coarse sand (1–0.5 mm.)	Medium sand (0.5–0.25 mm.)	Fine sand (0.25–0.1 mm.)	Very fine sand (0.1–0.05 mm.)
	Inches	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Payson silt loam.	0–2	A–21	20	68	12	0	0	0	3	17
	2–4	A22	18	68	14	0	0	0	2	16
	4–9	B2t	13	53	34	0	0	0	2	11
	9–24	B3ca	28	30	42	0	1	2	3	22
	24–30	C1	22	52	26	0	0	0	3	19
Pleasant View loam.	0–4	Ap	46	38	16	8	13	8	8	9
	4–11	A12	40	42	18	5	10	8	8	9
	11–25	A12	48	39	13	16	10	7	7	8
	25–34	A13	50	33	17	12	12	9	9	8
	34–45	C1ca	60	25	15	18	16	12	8	6
	45–56	C2ca	66	21	13	28	15	10	8	5
	56–67	C3	73	16	11	36	18	9	6	4
Preston fine sand.	0–7	A1	95	4	1	0	5	32	50	8
	7–20	AC	95	4	1	1	5	31	49	8
	20–48	C1	96	4	0	1	7	37	46	5
	48–65	C	96	4	0	0	8	37	47	4
Refuge loam.	0–3	A11	43	48	9	0	0	1	26	16
	3–8	A12	34	50	16	0	0	0	16	18
	8–21	C1	56	35	9	0	0	0	40	16
	21–35	C2sa	42	43	15	0	0	0	25	17
	35–47	C2sa	44	46	10	0	0	2	23	19
	47–71	C3	88	9	3	0	1	3	78	6
Ridd stony sandy loam.	0–5	A11	74	21	5	19	20	11	16	9
	5–9	A12	66	23	11	11	18	11	17	9
	9–18	B2t	64	19	17	12	15	10	18	9
	18–26	B3	67	18	15	11	18	11	19	8
	26–36	C1	66	23	11	10	16	11	19	10
Roshe Springs silt loam.	0–7	Ap	25	46	29	1	4	4	88	8
	7–12	A12ca	25	46	29	1	3	4	8	9
	12–20	C1cag	25	47	28	2	4	4	7	8
	20–33	C1cag	27	46	27	2	5	4	7	9
	33–52	C2cag	45	41	14	4	7	8	12	14
	52–80	C3g	62	31	7	8	11	15	20	8
Saltair silty clay loam.	0–1	A1sa	33	56	11	0	0	0	6	27
	1–4	C1sa	29	49	22	0	0	0	6	23
	4–9	C2sa	22	57	21	0	0	0	3	19
	9–20	C3sa	15	57	28	0	0	0	3	12
	20–32	C4sa	24	54	22	0	0	0	6	18
	32–44	IIC5sa	6	64	30	0	0	0	1	5
	44–60	IIC6sa	3	64	33	0	0	0	1	2
Steed fine sandy loam.	0–2	A11	57	31	12	1	1	2	34	19
	2–9	A12	69	22	9	0	1	2	43	25
	9–13	C1	84	11	5	0	1	5	60	18
	13–17	C2	88	7	5	7	15	18	35	13
	17–24	IIC3	98	0	2	19	33	24	19	3
Sterling cobbly loam.	0–5	Ap	48	37	15	11	12	7	10	8
	5–16	A12	38	42	20	9	9	5	8	7
	16–22	C1ca	48	34	18	13	10	6	10	9
	22–27	C2ca	56	31	13	17	14	7	10	8
	27–36	C3	62	29	9	23	16	7	9	7
	36–48	C3	58	31	11	13	14	8	12	11

See footnotes at end of table.

properties of selected soils—Continued

Coarse fragments (larger than 2 mm.)	Organic carbon	Total nitrogen	Calcium carbonate equivalent	Water content at 15 atmospheres	Reaction (pH)		Cation-exchange capacity	Extractable bases (meq. per 100 gm. of soil)		Soluble salt (Bureau cup)	Electrical conductivity (millimhos per cm. at 25° C.)
					Saturated paste	1:5 H_2O		Na	K		
Percent	*Percent*	*Percent*	*Percent*	*Percent*			*Meq./100 gm. of soil*			*Percent*	
	1.6	0.14	0	6.9	7.0	7.3	15.7			0.04	1.7
	1.0	.11	0	6.7	7.3	8.1	12.1	0.6	1.4	.02	.6
	.5	.04	9	17.1	8.1	9.5	20.8	4.2	2.6	.1	1.0
	.4	.04	38	23.3	8.9	10.0	20.5	10.3	1.9	.2	2.3
	.2		16	16.4	9.1	10.0	14.0	11.8	1.3	.6	6.8
12	1.2	.12	0		7.6	8.4	12.8	.5	2.6		1.0
18	1.2	.11	(2)		7.2	8.0	15.0	.3	1.0		.6
15	.9	.10	(2)	8.5	7.2	7.9	13.9	.3	.7		.6
15	.8		(2)		7.4	8.0	12.7	.4	.7		1.0
18	.8		10		8.0	8.8				.03	.8
21	.6		14		8.0	9.0				.03	.6
24	.4		13		8.1	9.0				.03	.7
	.2	.02	0	1.8	7.0	7.6	2.8	.1	.2	<.02	.2
	.1	.01	0	1.7	6.9	7.2	2.9	.1	.2	.02	.2
	.1		0	1.6	7.0	7.1	2.4	.1	.2	.02	.2
	.1		0	1.5	7.4	7.3	2.3	.2	.2	.02	.3
	1.3	.11	8	5.7	7.6	8.5	8.8	3.5	1.7	.8	25
	.6	.05	14	9.3	8.6	9.7	7.1	6.9	1.8	1.1	23
	.4		13	6.9	8.6	9.8	10.6	5.9	.9	1.8	34
	.6		12	8.5	8.3	9.4	10.1	9.8	1.0	>2.2	49
	.5		11	6.7	8.2	9.4	10.7	3.3	.8	>2.2	52
	.2		7	2.1	8.3	9.3	9.2	.6	.3	1.6	47
21	1.0	.07	0	3.9	6.7	7.0		.2	.4	.02	.7
13	.9	.06	0	6.1	7.3	7.4	10.4	.3	.6	.02	.4
35	.3	.03	0		7.0	7.4	16.3			.02	.4
23	.3		0	8.0	6.6	7.4	15.9	.2	.3	.02	.2
50			0		7.0	7.4	18.3			.02	.4
	3.5	.30	46	16.4	7.3	8.3	25.5	.3	.6	.04	1.1
	2.6	.23	54	16.1	7.5	8.4	23.5	.4	.3	.03	.8
	1.3	.12	70	14.0	7.7	8.6	17.0	.4	.3	.04	.9
	.9		78	12.6	7.7	8.6	11.7	.5	.3	.02	.9
1	.7		77	9.5	7.8	8.7	6.3	.3	.2	<.02	.6
10	.3		30	5.1	7.8	8.8	5.5	.4	.3	<.02	.5
	.6		16		8.2	[3] 9.3	7.8	11.9	0.8		203
	.4		21		8.6	9.7	15.9	5.2	1.4		93
	.2		22		9.0	9.9	15.9	9.9	1.4		66
	.2		27		8.9	9.8	18.6	10.9	1.3		70
	.2		28		8.8	9.8	15.9	3.3	1.1		82
	.2		30		8.7	9.7	16.2	4.1	1.2		76
	.3		22		8.8	9.7	17.6	5.9	1.2		74
	3.3	.20	6	9.1	7.7	8.5	18.0	.3	.6	.03	1.2
	.8	.05	6	4.3	7.8	8.6	9.3	.3	.4	.02	.7
	.3	.02	4	2.8	8.0	8.9	4.8	.3	.3	.02	.4
50	.3		3	2.4	8.0	8.8	4.0	.3	.3	.02	.4
73					8.2	8.9	2.4	.4		.02	.5
27	2.2	.18	11	8.4	7.7	8.4	16.9	.3	1.0	.03	.7
28	1.8	.17	9	9.9	7.7	8.4	18.8	.3	.6	.03	.6
28	.9	.11	22		7.9	8.6	11.8	.3	.4	.02	.5
31	.6		22		8.1	8.7	7.6	.3	.3	.02	.5
34	.5		17	4.4	8.1	8.8	6.5	.3	.3	.02	.4
58	.4		15	4.7	8.0	8.7	7.1		.3	.02	.4

TABLE 11.—*Physical and chemical*

Soil	Depth	Horizon	Size class and diameter of particles							
			Total			Sand fraction				
			Sand (2–0.05 mm.)	Silt (0.05–0.002 mm.)	Clay (<0.002 mm.)	Very coarse sand (2–1 mm.)	Coarse sand (1–0.5 mm.)	Medium sand (0.5–0.25 mm.)	Fine sand (0.25–0.1 mm.)	Very fine sand (0.1–0.05 mm.)
	Inches	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Sunset loam.	0–7	Ap	44	38	18	0	1	2	30	11
	7–18	A12	43	39	18	0	0	1	29	13
	18–32	AC	45	40	15	0	0	0	29	16
	32–44	C1	24	46	20	0	0	0	19	15
	44–68	C2	34	49	17	0	0	0	21	13
Syracuse loamy fine sand. [1]	0–11	A11	85	6	9					
	11–21	AC	78	10	12					
	21–30	C1ca	75	11	14					
	30–60	C2ca	75	9	16					
Terminal loam. [1]	0–4	A11	47	38	15					
	4–10	A12	49	37	14					
	10–14	B2t	51	19	30					
	14–22	C1ca	61	14	25					
	22–24	C2cam (Hardpan)								
	24–35	C3g	2	59	39					
	35–72	C4	13	55	32					
Timpanogos loam.	0–6	Ap	42	40	18	1	1	5	11	24
	6–15	A12	44	36	20	1	1	5	11	26
	15–27	B2t	45	31	24	0	1	3	8	34
	27–39	C1ca	36	46	18	0	1	5	7	22
	39–60	C2	56	33	11	2	2	5	7	40
Timpanogos very fine sandy loam, noncalcareous variant.	0–7	A1	53	32	15	1	1	1	21	29
	7–12	B1	53	30	17	1	1	1	21	29
	12–19	B21t	53	28	19	1	1	1	32	28
	19–31	B22t	52	30	18	0	1	1	16	34
	31–48	B3	47	34	19	0	0	0	18	34
	48–73	C1	56	31	13	0	0	0	18	38
Trenton silt loam.	0–4	A1	36	52	12	4	3	5	15	9
	4–7	B21t	22	43	35	2	2	3	10	5
	7–13	B22t	10	46	44	1	1	1	4	3
	13–33	B3ca	7	65	28	0	0	1	1	5
	33–60	C	6	71	23	0	0	0	0	6
Warm Springs fine sandy loam.[1]	0–8	A1	70	14	16					
	8–15	C1ca	67	13	20					
	15–24	C2ca	70	10	20					
	24–37	C3ca	76	7	17					
	37–60	C4g	80	9	11					
Wayment silty clay loam.	0–3	A1sa	15	60	25	0	0	0	4	11
	3–9	ACsa	4	61	35	0	0	0	1	3
	9–24	C1sa	10	64	26	0	0	0	3	7
	24–46	C2sa	17	51	32	0	0	1	11	5
	46–63	C3sa	48	34	18	0	0	1	33	14
Woods Cross silty clay loam.[1]	0–6	Ap	19	52	29					
	6–37	A12	15	45	40					
	37–72	C1g	6	51	43					

[1] Particle-size distribution determined by hydrometer; all other by pipette method.
[2] Trace.

properties of selected soils—Continued

Coarse fragments (larger than 2 mm.)	Organic carbon	Total nitrogen	Calcium carbonate equivalent	Water content at 15 atmospheres	Reaction (pH)		Cation-exchange capacity	Extractable bases (meq. per 100 gm. of soil)		Soluble salt (Bureau cup)	Electrical conductivity (millimhos per cm. at 25° C.)
					Saturated paste	1:5 H_2O		Na	K		
Percent	*Percent*	*Percent*	*Percent*	*Percent*			*Meq./100 gm. of soil*			*Percent*	
	1.1	0.10	9	8.2	7.6	8.5	15.1	0.3	0.5	0.04	0.7
	.8	.07	10	7.4	7.8	8.6	14.9	.3	.4	.04	.6
	.8		10	7.7	7.9	8.6	13.1	.4	.3	.03	.5
	.6		11	9.2	7.8	8.7	15.0	.4	.4	.04	.5
	.5		13	8.4	7.9	8.8	13.5	.4	.3	.03	.5
			1		7.9	8.4				.03	
			3		8.0	8.8				.03	
			11		8.9	9.7				.1	
			18		9.1	9.9				.1	
	1.6		3		7.8	7.9				.5	
	.6		1		7.2	8.9				.2	
			8		8.0	9.3				.5	
			26		8.3	9.6				.5	
			50		8.5	9.9				.3	
			33		8.8	9.8				.6	
			50		8.7	9.2				.7	
	1.9	.16	(2)	7.6	7.5	7.9	22.2	.3	.9	.04	.8
	1.1	.10	(2)	7.6	7.5	7.9	18.4	.2	.5	.03	.5
	.5	.06	(2)	9.5	7.3	8.1	18.1	.2	.4	.1	.6
	.4	.04	43	7.2	7.9	9.2	10.0	.2	.2	.02	.4
	.1	.02	30	3.8	8.3	9.3	6.5	.2	.2	.02	.4
	1.0	.11		6.3	6.9	7.8	11.0	.4	1.0	.03	.8
	.4	.05		7.0	6.5	7.6	13.0	.4	.3	.02	.4
	.2	.05		7.9	6.6	7.4	11.6	.4	.8	.03	.5
	.2	.04		8.0	6.5	7.6	11.6	.3	.7	.03	.6
	.2			8.4	6.4	7.5	13.1	.4	1.0	.03	.3
	.1			6.6	6.8	7.9	10.3	.4	.4	.03	.0
	1.4	.11	0		7.3	7.8	16.8			.1	1.6
	.7	.07	0		7.5	8.7	24.4			.1	.9
	.4	.05	5		7.6	9.4	25.3	3.4		.1	1.0
	.2	.03	35		8.4	9.9	17.6	7.2		.4	5.6
			29		8.8	10.0	16.1	7.1		.3	3.8
	.8		8		7.5	8.4				.8	
	.3		15		9.4	10.1				.8	
			20		9.5	10.2				.8	
			24		9.6	10.2				.8	
			19		9.9	10.4				.9	
	1.1	.07	4	11.9	7.8	8.5	14.6	7.5	.9	>2.4	100
	.9	.06	14	14.8	7.9	8.7	19.0	5.8	.8	>2.4	71
	.5	.04	13	11.4	8.0	9.0	14.5	7.5	.5	>2.4	71
	.4		12	13.9	8.0	9.0	14.5	11.6	3.2	>2.4	46
	.3		13	8.0	8.0	9.0	7.8	1.1	1.1	>2.2	26
	2.8		2		7.5	8.1				.1	
	1.6		2		7.6	8.1				.1	
	.9		2		7.7	8.5				.1	

[3] 1:10 H_2O.

by three consecutive washings with neutral normal ammonium acetate. The amount of sodium was then measured on the flame photometer.

Extractable bases, sodium and potassium, are reported in table 11. Sodium was extracted by washing the sample three times with neutral normal ammonium acetate, followed each time with centrifugation and filtering. The final extraction was at the ratio of 1 to 25. The amount of sodium in this extract was then measured using the flame photometer and lithium as the internal standard. Potassium was measured for the same extract and by the same methods.

In determining the soluble salts, the standard Bureau of Soils cup was used to obtain the ohms of resistance of the soil paste at saturation moisture content. The percentage of total soluble salts was then obtained from standard tables after correcting for soil texture and temperature.

Additional Facts About the Davis-Weber Area[7]

This section describes the early settlement and development of the Davis-Weber Area. It also gives facts about the agriculture and briefly discusses the main industries. Figures used are from records of the U.S. Bureau of the Census. These figures are for the two counties but are typical of the Davis-Weber Area.

The first settlements in the Davis-Weber Area were made in 1847 by pioneers of the Mormon faith. These early settlers irrigated and farmed the soils. Religious beliefs, community ties, and need for protection, however, led them to settle in what were called agricultural villages—the forerunners of the towns of the present day—rather than on farms. In 1848 Bountiful, now the second largest city in the survey area and the largest city in Davis County, was established. Ogden, the county seat of Weber County, was laid out in 1850 and was incorporated in 1861. It is the largest city in the survey area and the second largest city in the State of Utah.

In 1869 the Union Pacific Railway from the east and the Central Pacific Railway from the west were extended to a point about 60 miles northwest of Ogden and met at that place. To commemorate the meeting of these two roads, the last spike driven was of gold. These railways brought additional people into the Davis-Weber Area and made easier the shipping of produce.

From 1940 to 1950, Davis was the fastest growing county in the State of Utah. During that period, the population of the county nearly doubled. About a third of the population lived in rural areas. The population of Davis County continued to increase rapidly after 1950—from 30,867 in 1950 to 64,760 in 1960. The population of Weber County also increased rapidly—from 83,032 in 1950 to 110,744 in 1960. The city of Ogden had a population of 70,197 in 1960.

As a result of the increase in the number of people in the survey area, some land, formerly used for orchards or field crops, has been converted to other uses. A large part of the land formerly used for orchards is now used for housing developments. Such areas near Roy City in Weber County, and on uplands near North Ogden, have been rapidly taken over for developments. Other areas near Riverdale, as well as large areas near Bountiful, Kaysville, and Layton that were formerly valuable for farming, are now used for homes. In 1960 cities and towns occupied about 7,000 acres in Davis County and 25,000 acres in Weber County.

Agriculture

About 2,115 farms are in the survey area. Irrigation farming and dryfarming are both practiced, but irrigation farming is practiced much more extensively than dryfarming. In 1959 about 88 percent of the total number of farms in Davis County and 90 percent of the total number in Weber County were irrigated. Water for irrigation is of the greatest importance in the survey area. Additional water was made available in 1959, when the aqueduct from the Weber River was completed. Water from that source is used for irrigating much of the land that was formerly dryfarmed.

The present farms in the survey area are smaller than those of the early settlers, although the original farms were not large. The reason for the small size is that many of the original farms passed from the ownership of the first settlers to their descendants, and were divided among the members of large families. In 1959 about 21 percent of the total number of farms in Davis County and nearly 15 percent of the total number in Weber County were less than 10 acres in size. Many other farms in these two counties are between 10 and 49 acres in size. The total number of farms has decreased during the past 10 years.

In the survey area, the number of farm operators working off the farm has increased since 1945. In that year about half of the total number of farm operators performed some work off the farm. By 1955 the number had increased to about three-fourths of the total number of farm operators.

During the past few years, the feeding of beef cattle and the production of milk and cream for market have increased and cash crops have decreased in importance. In 1959 only about 31 percent of the income from the sale of farm products in these two counties was derived from the sale of field crops, vegetables, and fruits. Nevertheless, a number of different crops are still grown on the benches west of the Wasatch Mountains. On those benches alfalfa, cereal crops, potatoes, onions, tomatoes, peas, sugarbeets, and sweet corn are all grown for sale. Table 12 gives the acreage of the principal crops and the number of fruit trees and grapevines in Davis and Weber Counties for the years 1954 and 1959.

The most common fruits grown in the survey area, mainly on the high terraces and foothills, are peaches, apricots, cherries, apples, pears and different kinds of berries. The terraces and foothills are well suited to fruit trees, because they have good air drainage. The fruit is less subject to damage from frost than that grown in other parts of the survey area. The lake plain is used primarily for grazing and for the production of native hay.

[7] VERN K. HUGIE and RAYMOND CHADWICK, soil scientists, Soil Conservation Service, assisted in the preparation of this section.

TABLE 12.—*Acreage of the principal crops and number of fruit trees and grapevines of all ages in Davis and Weber Counties, Utah*

Crop	Davis County		Weber County	
	1954	1959	1954	1959
	Acres	*Acres*	*Acres*	*Acres*
Alfalfa	12, 587	9, 385	17, 673	14, 879
Barley	3, 177	3, 935	4, 181	4, 896
Corn grown for all purposes	4, 188	5, 306	2, 695	3, 538
Oats	408	438	1, 515	1, 092
Potatoes (Irish)	334	413	515	391
Sugar beets	1, 756	2, 064	2, 659	2, 971
Wheat	3, 706	2, 725	3, 112	3, 811
Wild hay	1, 566	1, 240	388	340
Vegetables (mainly tomatoes)	2, 701	1, 782	2, 504	1, 817
	Number	*Number*	*Number*	*Number*
Apple trees	10, 009	7, 952	10, 691	4, 982
Apricot trees	31, 952	16, 966	37, 314	27, 616
Cherry trees	37, 402	26, 118	47, 996	35, 331
Peach trees	62, 285	21, 541	43, 309	19, 142
Pear trees	8, 101	1, 729	6, 358	4, 724
Plum and prune trees	3, 314	1, 256	1, 228	644
Grapevines	30, 602	16, 984	4, 701	6, 659

Although vegetables, field crops, and fruit are important sources of income in the survey area, about 69 percent of the income from the sale of farm products in these two counties was derived from the sale of livestock and livestock products in 1959. Table 13 shows the kinds and numbers of livestock raised in the two counties for the years 1954 and 1959. Among the main sources of farm income are feeder cattle. The average size of the herds of beef cattle fed for market has increased during the past few years, and the size of the average herd of dairy cattle has also increased. The average-sized herd of dairy cattle consists of about 38 cows, but 100 or more cows are in some herds.

TABLE 13.—*Numbers and kinds of livestock on farms*

Kind of livestock	Davis County		Weber County	
	1954	1959	1954	1959
	Number	*Number*	*Number*	*Number*
Horses and mules	1, 205	1, 103	1, 674	1, 588
Cattle and calves	23, 209	23, 019	31, 204	24, 392
Milk cows	3, 870	3, 420	6, 855	6, 554
Hogs	2, 549	2, 839	2, 216	3, 317
Sheep and lambs	51, 542	33, 819	24, 509	19, 131
Chickens [1]	48, 553	18, 764	95, 086	58, 967
Turkeys raised	94, 258	160, 057	25, 130	149, 035

[1] More than 4 months old.

Industrial Development

Food-processing plants, meatpacking plants, and shops for electromotive repair are among the larger industries in the Davis-Weber Area. Also, large plants where oil is brought in by pipeline and is refined are located in the survey area. More than 2 million head of livestock are sold annually from the local stockyards.

About 185 industrial, manufacturing, and wholesale establishments are located in the city of Ogden alone. Also located in or near that city are large stockyards and canning factories, as well as many large elevators where grain is stored for use in the grain, feed, and milling industries. Employment offered by these industries, as well as by other establishments, has added greatly to the farm income and has had a great effect on the economy of the area.

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Glossary

Alkali soil. Generally, a highly alkaline soil. Specifically, an alkali soil that has so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that the growth of most crop plants is reduced.

Alluvial fan. A fan-shaped deposit of sand, gravel, and fine material dropped by a stream where its gradient lessens abruptly.

Alluvium. Soil material, such as sand, silt, or clay, that has been deposited on land by streams.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern.

Available water capacity. The total quantity of water that will not drain away but can be taken up by plant roots within the root zone, or to a depth of 5 feet if no root-inhibiting factor is present. The ratings are (1) *low*, less than 4 inches; (2) *moderate*, 4 to 7.5 inches; and (3) *high*, more than 7.5 inches.

Azonal soil. A group of soils that have no well-developed profile characteristics, because of lack of time for development or because of type of parent material or relief that prevents the development of strong profile characteristics.

Border irrigation. A method of irrigation in which the lateral surface flow of water is controlled with small earth ridges called border dikes.

Calcareous soil. A soil containing enough calcium carbonate (often with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid.

Clay. As a soil separate, the mineral soil particle less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Colluvium. Mixed deposits of rock fragments and coarse soil materials near the bases of steep slopes. The deposits have accumulated as the result of soil creep, slides, or local wash.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent; will not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a wire when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material, and tends to stretch somewhat and pull apart, rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard and brittle; little affected by moistening,

Control section. The part of a soil profile that strongly influences the placement of a soil in the current system of soil classification. As used in this survey area, it is from a depth of 10 inches to 40 inches, or to the bottom of the diagnostic horizon if that horizon extends below 40 inches but not below 60 inches.

Dryfarming. Producing crops that require some tillage without irrigation. The system requires periods of fallow between crops so that water from precipitation can be absorbed and retained.

Fallow. Leaving cropland idle in order to restore productivity, mainly through accumulation of water, nutrients, or both. For at least one growing season, the soil is tilled, but not planted for the purpose of controlling weeds, aiding in the decomposition of plant residues, and encouraging the storage of moisture for the succeeding crop.

Furrow irrigation. A method of using furrows to apply irrigation water to crops planted in rows.

Green-manure crop. Any crop grown and plowed under to improve the soil by the addition of organic matter.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes. These are the major horizons:

O horizon.—The layer of organic matter on the surface of a mineral soil. This layer consists of decaying plant residues.

A horizon.—The mineral horizon at the surface or just below an O horizon. This horizon is the one in which living organisms are most active and it is therefore marked by the accumulation of humus. The horizon may have lost one or more of soluble salts, clay, and sesquioxides (iron and aluminum oxides).

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused by accumulation of clay, sesquioxides, humus, or some combination of these. The combined A and B horizons are usually called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The weathered rock material immediately beneath the solum. This layer, commonly called the soil parent material, is presumed to be like that from which the overlying horizons were formed in most soils. If the underlying material is known to be different from that in the solum, a Roman numeral precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock usually underlies a C horizon but may be immediately beneath an A or B horizon.

Intrazonal soil. Any of the great soil groups having rather well developed soil characteristics that reflect the dominating influence of some local factor of relief, parent material, or age over the effect of the climate and vegetation.

Leaching. The removal of materials in solution by the passage of water through soil.

Leveling (of land). The reshaping or modification of the land surface to a planned grade to provide a more suitable surface for the efficient application of irrigation water and to provide proper surface drainage.

Mottling, soil. Irregularly marked with spots of different colors that vary in number and size. Mottling in soils usually indicates poor aeration and lack of drainage. Descriptive terms are as follows: Abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent.* The size measurements are these: *fine,* less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; *medium,* ranging from 5 millimeters to 15 millimeters (about 0.2 to 0.6 inch) in diameter along the greatest dimension; and *coarse,* more than 15 millimeters (about 0.6 inch) in diameter along the greatest dimension.

Munsell notation. A system for designating color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with a hue of 10YR, a value of 6, and a chroma of 4.

Nutrients, plant. The elements that may be taken in by a plant, essential to its growth, and used by it in construction of its food and tissue. Plant nutrients are nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, zinc, molybdenum, and perhaps others obtained from the soil, and carbon, hydrogen, and oxygen obtained mainly from air and water.

Parent material (soil). The horizon of weathered rock or partly weathered soil material from which soil has formed; horizon C in the soil profile.

Ped. An individual natural soil aggregate such as a crumb, a prism, or a block, in contrast to a clod, which is a mass of soil brought about by digging or other disturbance.

Permeability. That quality of the soil that enables it to transmit water or air. Terms used to describe permeability are: *very slow, slow, moderate, rapid, and very rapid.*

pH value. A numerical means for designating acidity and alkalinity in soils. A pH value of 7.0 indicates precise neutrality; a higher value alkalinity; and a lower value, acidity.

Profile, soil. A vertical section of the soil through all its horizons and extending into the parent material. See Horizon, soil.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is precisely neutral in reaction because it is neither acid nor alkaline. An acid, or "sour," soil is one that gives an acid reaction; an alkaline soil is one that is alkaline in reaction. In words, the degrees of acidity or alkalinity are expressed thus:

	pH		*pH*
Extremely acid	below 4.5	Neutral	6.6 to 7.3
Very strongly acid	4.5 to 5.0	Mildly alkaline	7.4 to 7.8
Strongly acid	5.1 to 5.5	Moderately alkaline	7.9 to 8.4
Medium acid	5.6 to 6.0	Strongly alkaline	8.5 to 9.0
Slightly acid	6.1 to 6.5	Very strongly alkaline.	9.1 and higher

Reclamation, soil. In this area, the removal of excess water, salts, and alkali from the soil profile in order to make it suitable for crops.

Relief. The elevations or inequalities of a land surface, considered collectively.

Saline soil. A soil containing soluble salts in quantities that impair its productivity for plants, but not containing an excess of exchangeable sodium.

Saline-alkali soil. A soil having a combination of a harmful quantity of salts and either a high degree of alkalinity or a large amount of exchangeable sodium, or both, so distributed in the soil profile that the growth of most crop plants is significantly reduced.

Sand. Individual rock or mineral fragments in soils having diameters ranging from 0.05 to 2.0 millimeters. Most sand grains consist of quartz, but they may be of any mineral composition. The textural class name of any soil that contains 85 percent or more sand and not more than 10 percent clay.

Silt. Individual mineral particles in a soil that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). Soil of the silt textural class is 80 percent or more silt and less than 12 percent clay.

Solum. The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. The solum in mature soil includes the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristics of the soil are largely confined to the solum.

Subsoil. That part of the soil profile commonly below plow depth and above the parent material.

Substratum. Any layer lying beneath the solum, or true soil; the C or R horizon.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, about 5 to 8 inches in thickness. The plowed layer.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay.* The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Water table. The highest part of the soil or underlying rock material that is wholly saturated with water. In some places an upper, or perched, water table may be separated from a lower one by a dry zone.

Zonal soil. Any of the great soil groups having well-developed soil characteristics that reflect the influences of climate and living organisms, chiefly vegetation.

O

GUIDE TO MAPPING UNITS

[For a full description of a mapping unit, read both the description of the mapping unit and the description of the soil series to which the mapping unit belongs.

[See table 3, page 22, for estimated yields of each irrigated unit; table 4, page 24, for estimated yields of each dryfarmed unit; and table 9, page 72, for approximate acreage and proportionate extent of the soils. See pages 33 to 66 for information on engineering properties of the soils. Dashed lines indicate soil was not assigned to a capability unit or is not used for nor suited to range]

Map symbol	Mapping unit	Described on page	Capability unit		Range site	
			Symbol	Page	Name	Page
Aa	Abbott clay	74	VIIw-1	21	Salt Meadow	28
AbB	Ackmen loam, 1 to 3 percent slopes	74	IIe-2	11	----------	--
AbC	Ackmen loam, 3 to 6 percent slopes	74	IIIe-2	14	----------	--
AbD	Ackmen loam, 6 to 10 percent slopes	75	IIIe-3	15	Upland Loam	30
AbE2	Ackmen loam, 10 to 20 percent slopes, eroded	75	IVe-4	18	Upland Loam	30
Ac	Airport silt loam	75	IIIw-4	15	Alkali Bottom	27
Ad	Airport silty clay loam	75	IVw-3	18	Alkali Bottom	27
Ae	Airport soils, shallow water table	76	VIIw-1	21	Salt Meadow	28
AF	Airport-Ford complex	76				
	Airport soil	--	IIIw-4	15	Alkali Bottom	27
	Ford soil	--	IVw-3	18	Alkali Bottom	27
AS	Arave-Saltair complex	76				
	Arave soil	--	VIIw-1	21	Salt Meadow	28
	Saltair soil	--	VIIIw-1	21	----------	--
BaE	Barton rocky loams, 5 to 30 percent slopes	77	VIs-1	20	Upland Stony Loam	31
BrG	Barton very rocky loams, 30 to 40 percent slopes	77	VIIs-1	21	Upland Stony Loam	31
CaA	Chance loam, 0 to 3 percent slopes	77	IIIw-2	15	Wet Meadow	32
CIA	Chance-Ironton complex, 0 to 3 percent slopes	77				
	Chance soil	--	IIIw-2	15	Wet Meadow	32
	Ironton soil	--	IIw-4	13	Semiwet Meadow	30
Co	Cobbly alluvial land	78	VIIw-1	21	----------	--
Cr	Croy loam	78	VIw-1	20	Alkali Bottom	27
CuA	Cudahy silt loam, 0 to 3 percent slopes	78	IIIw-8	16	Wet Meadow	32
DaA	Draper loam, 0 to 1 percent slopes	79	IIw-3	13	Semiwet Meadow	30
DaB	Draper loam, 1 to 3 percent slopes	80	IIw-4	13	Semiwet Meadow	30
DrA	Draper loam, drained, 0 to 1 percent slopes	79	IIw-3	13	Semiwet Meadow	30
DrB	Draper loam, drained, 1 to 3 percent slopes	79	IIw-4	13	Semiwet Meadow	30
DrC	Draper loam, drained, 3 to 6 percent slopes	79	IIIw-1	15	Semiwet Meadow	30
DsB	Draper gravelly loam, gravelly subsoil variant, 1 to 3 percent slopes	80	IIw-4	13	Semiwet Meadow	30
DsC	Draper gravelly loam, gravelly subsoil variant, 3 to 6 percent slopes	80	IIIw-1	15	Semiwet Meadow	30
Fa	Ford loam	80	IVw-3	18	Alkali Bottom	27
Fb	Ford loam, shallow water table	80	IVw-3	18	Salt Meadow	28
FcB	Francis loamy fine sand, 0 to 3 percent slopes	81	IIIs-2	17	Upland Sand	31
FcC	Francis loamy fine sand, 3 to 6 percent slopes	81	IIIs-3	17	Upland Sand	31
FcD	Francis loamy fine sand, 6 to 10 percent slopes	81	IVs-2	19	Upland Sand	31
FcE2	Francis loamy fine sand, 10 to 20 percent slopes, eroded	81	IVs-3	19	Upland Sand	31
FcF2	Francis loamy fine sand, 20 to 30 percent slopes, eroded	81	VIs-1	20	Upland Sand	31
FKG2	Francis-Kidman complex, 20 to 50 percent slopes, eroded	82				
	Francis soil	--	VIIs-1	21	Upland Sand	31
	Kidman soil	--	VIe-1	20	Upland Loam	30
Go	Gooch silt loam	82	IVw-3	18	Salt Meadow	28
Gs	Gooch silt loam, strongly alkali	82	VIIw-1	21	Salt Meadow	28
HaA	Harrisville silt loam, 0 to 1 percent slopes	82	IIIw-4	15	Semiwet Meadow	30
HaB	Harrisville silt loam, 1 to 3 percent slopes	83	IIIw-5	16	Semiwet Meadow	30
HaC	Harrisville silt loam, 3 to 6 percent slopes	83	IIIw-5	16	Semiwet Meadow	30

GUIDE TO MAPPING UNITS--Continued

Map symbol	Mapping unit	Described on page	Capability unit		Range site	
			Symbol	Page	Name	Page
HLA	Harrisville-Leland complex, 0 to 1 percent slopes	83				
	Harrisville soil	--	IIIw-4	15	Semiwet Meadow	30
	Leland soil	--	VIw-1	20	Alkali Bottom	27
HMG2	Hillfield-Marriott complex, 30 to 60 percent slopes, eroded	84				
	Hillfield soil	--	VIIe-1	21	Upland Loam	30
	Marriott soil	--	VIIs-1	21	Upland Gravelly Loam	30
HnD2	Hillfield soils, 6 to 10 percent slopes, eroded	84	IIIe-3	15	Upland Loam	30
HnE2	Hillfield soils, 10 to 20 percent slopes, eroded	84	IVe-4	18	Upland Loam	30
HTF2	Hillfield-Timpanogos-Parleys complex, 20 to 30 percent slopes, eroded	83	VIe-1	20	Upland Loam	30
HTG2	Hillfield-Timpanogos-Parleys complex, 30 to 60 percent slopes, eroded	84	VIIe-1	21	Upland Loam	30
IaA	Ironton silt loam, 0 to 1 percent slopes	85	IIw-3	13	Semiwet Meadow	30
IaB	Ironton silt loam, 1 to 3 percent slopes	85	IIw-4	13	Semiwet Meadow	30
IaC	Ironton silt loam, 3 to 6 percent slopes	85	IIIw-1	15	Semiwet Meadow	30
IcA	Ironton silt loam, moderately alkali, 0 to 1 percent slopes	86	IIIw-4	15	Semiwet Meadow	30
IDA	Ironton-Draper complex, 0 to 3 percent slopes	86				
	Ironton soil	--	IIw-4	13	Semiwet Meadow	30
	Draper soil	--	IIw-3	13	Semiwet Meadow	30
KaA	Kidman fine sandy loam, 0 to 1 percent slopes	86	I-2	11	----------	--
KaB	Kidman fine sandy loam, 1 to 3 percent slopes	86	IIe-3	11	----------	--
KaC	Kidman fine sandy loam, 3 to 6 percent slopes	87	IIIe-2	14	----------	--
KaD	Kidman fine sandy loam, 6 to 10 percent slopes	87	IIIe-3	15	Upland Loam	30
KaE2	Kidman fine sandy loam, 10 to 20 percent slopes, eroded	87	IVe-4	18	Upland Loam	30
KbA	Kilburn sandy loam, 0 to 1 percent slopes	89	IIIs-1	17	----------	--
KbB	Kilburn sandy loam, 1 to 3 percent slopes	89	IIIs-2	17	----------	--
KbC	Kilburn sandy loam, 3 to 6 percent slopes	89	IIIs-3	17	----------	--
KcA	Kilburn stony sandy loam, 0 to 3 percent slopes	89	VIs-1	20	Upland Gravelly Loam	30
KFE2	Kilburn-Francis association, 10 to 20 percent slopes, eroded	90				
	Kilburn soil	--	IVs-3	19	Upland Gravelly Loam	30
	Francis soil	--	IVs-3	19	Upland Sand	31
KFF2	Kilburn-Francis association, 20 to 30 percent slopes, eroded	90				
	Kilburn soil	--	VIs-1	20	Upland Gravelly Loam	30
	Francis soil	--	VIs-1	20	Upland Sand	31
KFG2	Kilburn-Francis association, 30 to 50 percent slopes, eroded	90				
	Kilburn soil	--	VIIs-1	21	Upland Gravelly Loam	30
	Francis soil	--	VIIs-1	21	Upland Sand	31
KgB	Kilburn gravelly sandy loam, 1 to 3 percent slopes	88	IIIs-2	17	----------	--
KgC	Kilburn gravelly sandy loam, 3 to 6 percent slopes	88	IIIs-3	17	----------	--
KgD	Kilburn gravelly sandy loam, 6 to 10 percent slopes	87	IVs-2	19	Upland Gravelly Loam	30
KgE2	Kilburn gravelly sandy loam, 10 to 20 percent slopes, eroded	88	IVs-3	19	Upland Gravelly Loam	30

Map symbol	Mapping unit	Described on page	Capability unit		Range site	
			Symbol	Page	Name	Page
KlC	Kilburn cobbly sandy loam, 3 to 10 percent slopes	88	IVs-2	19	Upland Gravelly Loam	30
KlE2	Kilburn cobbly sandy loam, 10 to 20 percent slopes, eroded	88	VIs-1	20	Upland Gravelly Loam	30
KmA	Kilburn gravelly sandy loam, deep over clean sands, 0 to 3 percent slopes	88	IVs-1	19	Upland Gravelly Loam	30
KmC	Kilburn gravelly sandy loam, deep over clean sands, 3 to 10 percent slopes	89	IVs-2	19	Upland Gravelly Loam	30
Kr	Kirkham loam	91	IIw-3	13	Semiwet Meadow	30
Ks	Kirkham silty clay loam	90	IIw-1	12	Semiwet Meadow	30
Kt	Kirkham silty clay loam, strongly alkali	90	IVw-3	18	Alkali Bottom	27
KX	Kirkham-Airport silty clay loams	91	IVw-3	18	Alkali Bottom	27
La	Lakeshore silt loam	91	VIIIw-1	21	----------	--
Lb	Lakeshore fine sandy loam	91	VIIw-1	21	Alkali Bottom	27
LcB	Layton loamy fine sand, 0 to 3 percent slopes	92	IIs-2	14	----------	--
LcC	Layton loamy fine sand, 3 to 6 percent slopes	92	IIIs-3	17	----------	--
LcD	Layton loamy fine sand, 6 to 10 percent slopes	92	IVs-2	19	Upland Sand	31
LdB	Layton loamy fine sand, duned, 1 to 3 percent slopes	92	IVs-4	20	----------	--
Le	Leland silt loam	93	VIw-1	20	Alkali Bottom	27
LHA	Leland-Harrisville silt loams, 0 to 1 percent slopes	93				
	Leland soil	--	VIw-1	20	Alkali Bottom	27
	Harrisville soil	--	IIIw-4	15	Semiwet Meadow	30
LP	Leland-Airport-Croy complex	93				
	Leland and Croy soils	--	VIw-1	20	Alkali Bottom	27
	Airport soil	--	IVw-3	18	Alkali Bottom	27
LS	Leland-Saltair complex	93				
	Leland soil	--	VIIw-1	21	Alkali Bottom	27
	Saltair soil	--	VIIIw-1	21	----------	--
Lt	Logan silty clay loam	94	IIIw-2	15	Wet Meadow	32
Lu	Logan silty clay loam, moderately alkali	94	IVw-1	18	Salt Meadow	28
Lw	Logan silty clay loam, shallow water table	94	IVw-1	18	Wet Meadow	32
Ma	Made land	94	-----	--	----------	--
McE2	Marriott cobbly sandy loam, 10 to 30 percent slopes, eroded	94	VIs-1	20	Upland Gravelly Loam	30
MgD	Marriott gravelly sandy loam, calcareous variant, 6 to 10 percent slopes	95	IVs-2	19	Upland Gravelly Loam	30
MgE2	Marriott gravelly sandy loam, calcareous variant, 10 to 20 percent slopes, eroded	95	IVs-3	19	Upland Gravelly Loam	30
MrA	Martini fine sandy loam, 0 to 1 percent slopes	95	IIs-2	14	----------	--
MtA	Martini fine sandy loam, 0 to 1 percent slopes, channeled	96	IIs-2	14	Semiwet Meadow	30
PaA	Parleys loam, 0 to 1 percent slopes	96	I-1	11	----------	--
PaB	Parleys loam, 1 to 3 percent slopes	96	IIe-2	11	----------	--
PaC	Parleys loam, 3 to 6 percent slopes	96	IIIe-2	14	----------	--
PaD	Parleys loam, 6 to 10 percent slopes	96	IIIe-3	15	----------	--
PaE2	Parleys loam, 10 to 20 percent slopes, eroded	97	IVe-4	18	Upland Loam	30
PMA	Payson-Airport silt loams, 0 to 3 percent slopes	97				
	Payson soil	--	VIw-1	20	Alkali Bottom	27
	Airport soil	--	IIIw-4	15	Alkali Bottom	27
PNA	Payson-Warm Springs complex, 0 to 3 percent slopes	97	VIw-1	20	Alkali Bottom	27
PvB	Pleasant View loam, 1 to 3 percent slopes	98	IIe-3	11	----------	--
PvC	Pleasant View loam, 3 to 6 percent slopes	98	IIIe-2	14	----------	--

GUIDE TO MAPPING UNITS--Continued

Map symbol	Mapping unit	Described on page	Capability unit		Range site	
			Symbol	Page	Name	Page
PvD	Pleasant View loam, 6 to 10 percent slopes---	98	IIIe-3	15	Upland Loam	30
PvE	Pleasant View loam, 10 to 20 percent slopes--	98	IVe-4	18	----------	--
PvE2	Pleasant View loam, 10 to 20 percent slopes, eroded----------	98	VIe-1	20	Upland Loam	30
PwC	Pleasant View gravelly sandy loam, 3 to 6 percent slopes----------	98	IIIe-2	14	----------	--
PwD	Pleasant View gravelly sandy loam, 6 to 10 percent slopes----------	99	IIIe-3	15	----------	--
PxB	Preston fine sand, 1 to 10 percent slopes----	99	IVs-4	20	Upland Sand	31
PxE	Preston fine sand, 10 to 20 percent slopes---	99	VIs-1	20	Upland Sand	31
PyB	Preston fine sand, duned, 1 to 10 percent slopes----------	99	VIs-1	20	Upland Sand	31
Ra	Refuge loam----------	100	IVw-3	18	Alkali Bottom	27
RdD	Ridd stony sandy loam, 6 to 10 percent slopes----------	100	VIIs-1	21	Upland Stony Loam	31
RkE2	Ridd rocky sandy loam, 10 to 30 percent slopes, eroded----------	100	VIIs-1	21	Upland Stony Loam	31
RkG2	Ridd rocky sandy loam, 30 to 70 percent slopes, eroded----------	100	VIIs-1	21	Mountain Stony Loam	28
Ro	Rock outcrop----------	100	VIIIs-1	21	----------	--
Rs	Roshe Springs silt loam----------	101	IIIw-2	15	Wet Meadow	32
Rt	Roshe Springs silt loam, deep over clay------	101	IVw-1	18	----------	--
Rw	Roshe Springs silt loam, shallow water table-	101	IVw-1	18	Wet Meadow	32
Sa	Saltair silty clay loam----------	101	VIIIw-1	21	----------	--
SbA	Steed fine sandy loam, 0 to 1 percent slopes----------	102	IIIs-1	17	----------	--
ScA	Steed fine sandy loam, 0 to 1 percent slopes, channeled----------	102	IIIs-1	17	Upland Stony Loam	31
SdA	Steed gravelly fine sandy loam, 0 to 2 percent slopes----------	102	IVs-1	19	Upland Stony Loam	31
SeA	Steed gravelly fine sandy loam, 0 to 2 percent slopes, channeled----------	102	IVs-1	19	Upland Stony Loam	31
SfD	Sterling gravelly loam, 6 to 10 percent slopes----------	103	IVs-2	19	Upland Stony Loam	31
SgE	Sterling cobbly loam, 8 to 20 percent slopes-	103	IVs-3	19	Upland Stony Loam	31
ShF2	Sterling very rocky loam, 6 to 50 percent slopes, eroded----------	103	VIIs-1	21	Upland Stony Loam	31
SkA	Sunset loam, 0 to 1 percent slopes----------	104	IIw-3	13	Semiwet Meadow	30
SkB	Sunset loam, 1 to 3 percent slopes----------	104	IIw-4	13	Semiwet Meadow	30
SmA	Sunset loam, strongly alkali, 0 to 1 percent slopes----------	104	IIIw-6	16	Alkali Bottom	27
SnA	Sunset loam, gravelly substratum, 0 to 1 percent slopes----------	104	IIs-2	14	Semiwet Meadow	30
So	Syracuse loamy fine sand----------	104	IIw-5	14	----------	--
Sy	Syracuse loamy fine sand, strongly alkali----	105	IIIw-6	16	Alkali Bottom	27
Ta	Terminal loam----------	105	VIw-1	20	Alkali Bottom	27
TbA	Timpanogos loam, 0 to 1 percent slopes-------	106	I-1	11	----------	--
TbB	Timpanogos loam, 1 to 3 percent slopes-------	106	IIe-2	11	----------	--
TbC	Timpanogos loam, 3 to 6 percent slopes-------	105	IIIe-2	14	----------	--
TbD2	Timpanogos loam, 6 to 10 percent slopes, eroded----------	106	IIIe-3	15	Upland Loam	30
TbE2	Timpanogos loam, 10 to 20 percent slopes, eroded----------	106	IVe-4	18	Upland Loam	30
TcD	Timpanogos very fine sandy loam, noncalcareous variant, 6 to 10 percent slopes----	107	IIIe-3	15	Upland Loam	30
TcE	Timpanogos very fine sandy loam, noncalcareous variant, 10 to 20 percent slopes----------	106	IVe-4	18	Upland Loam	30
TDD	Timpanogos variant-Draper complex, 3 to 10 percent slopes----------	107				
	Timpanogos soil----------	---	IIIe-3	15	Upland Loam	30
	Draper soil----------	---	IIIe-3	15	Semiwet Meadow	30

GUIDE TO MAPPING UNITS--Continued

Map symbol	Mapping unit	Described on page	Capability unit		Range site	
			Symbol	Page	Name	Page
TrB2	Trenton silt loam, 1 to 3 percent slopes, eroded	107	IVw-3	18	Alkali Bottom	27
TrC3	Trenton silt loam, 3 to 10 percent slopes, severely eroded	107	VIw-1	20	Alkali Bottom	27
WaA	Warm Springs fine sandy loam, 0 to 1 percent slopes	108	IIw-3	13	----------	--
WaB	Warm Springs fine sandy loam, 1 to 3 percent slopes	108	IIw-4	13	----------	--
WdA	Warm Springs fine sandy loam, deep over clay, 0 to 1 percent slopes	108	IIIw-6	16	----------	--
WgA	Warm Springs fine sandy loam, strongly alkali, 0 to 1 percent slopes	108	IIIw-6	16	Alkali Bottom	27
WhA	Warm Springs fine sandy loam, strongly alkali, 0 to 1 percent slopes, channeled	108	VIw-1	20	Alkali Bottom	27
WlA	Warm Springs fine sandy loam, shallow water table, 0 to 1 percent slopes	108	IVw-1	18	Salt Meadow	28
Wm	Wayment silty clay loam	109	VIIIw-1	21	----------	--
WR	Wayment-Refuge complex	109				
	Wayment soil	---	VIIIw-1	21	----------	--
	Refuge soil	---	IVw-3	18	----------	--
Ws	Woods Cross silty clay loam	110	IIIw-2	15	Wet Meadow	32
Wt	Woods Cross silty clay loam, drained	109	IIIw-2	15	----------	--